ABSTRACT

Title of dissertation: IDENTIFYING THE NATURE OF METACOGNITION INSTRUCTION IN READING CLASSROOMS

Nesrin Ozturk, Doctor of Philosophy, 2017

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Metacognition helps control cognitions through the actions and interactions of metacognitive knowledge, experiences, and strategies. Since 1979, metacognition has been extensively studied and found to be an effective tool for learning. In reading, metacognition is associated with improved vocabulary, reading awareness, strategies, comprehension, and task performance. Research confirmed metacognition can be successfully taught. However, it has limited influence on mainstream classrooms; classroom instruction lacks pedagogies of metacognition. Paradoxically, teachers' practices have been assessed inconsistently and independent of students' metacognition. For these problems, this study developed a pedagogy of metacognition (PMR) and

examined the structural validity of its measurement instrument (ITMR). Following a comprehensive literature review, a PMR consisted of fostering students' metacognitive knowledge, adopting goal-directedness, integrating language of thinking, scaffolding students' strategic reading, encouraging their independence with strategic reading, assessing metacognition, and prolonging instruction. Then, scale validation procedures were followed. After scale items were generated, QUAID examination, expert, cognitive, and focus-group interviews were conducted for content and construct validity. Following the ITMR's initial simulation, the data were collected from reading teachers in the United States of America. The data were collected by a computer-assisted survey method and a non-probability sampling technique. Then, the data were analyzed by a factor analysis method, Welch's, and Spearman's tests. The ITMR at elementary school level was found to have a unidimensional model accounting for 60% of the total variance (α.97). There were no mean differences in teachers' self-reported metacognition instruction practices at any grade levels. All dimensions of the ITMR were strongly and positively correlated. By these findings, the significance of this study was recognized and its contributions to the literature were summarized. Also, the discrepancy between the literature and the ITMR and the congruence of metacognition instruction practices across elementary grades was discussed. Assessment practices were recognized as potential aids for classroom metacognition instruction. Future studies were recommended to improve the validity of the ITMR and understanding of classroom metacognition instruction. Educational implications aimed to support both in-service and pre-service teachers as possible. Finally, limitations with scale development, scale's generalizability, data collection, and analyses were discussed.

IDENTIFYING THE NATURE OF METACOGNITON INSTRUCTION IN READING CLASSROOMS

by

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Dissertation submitted to the Faculty of the Graduate School of the
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Dünyayı daha güzel bir yere çevirecek TÜM çoçuklara

&

Ailem'e

Canım anneme, babama, ve kardeş tatlıma

To ALL children who will change the world to a better place

&

To my family;

My dearest mom, beloved dad, and sweetheart little brother

İnanın:

güzel günler göreceğiz çocuklar

güneşli günler

göre-

-ceğiz.

Motorları maviliklere süreceğiz çocuklar,

ışıklı maviliklere

süre-

-ceğiz.....

Nâzım Hikmet Ran

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This is a work of love for knowledge. This is a work of perseverance. This is a work of good-hearted people striving for the best of all. This is a work that ignites hope in me again for the peace around the world.

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CHAPTER 1: INTRODUCTION

"Teachers: the new generation will be your devotion"

Mustafa Kemal Atatürk

Metacognition and Reading

Metacognition pertains to thinking about thinking (Baker & Brown, 1984a; Flavell, 1979; Veenman, 2016). According to Flavell (1979), cognitions can be controlled through the actions and interactions of metacognitive knowledge, metacognitive strategies, and metacognitive experiences. Metacognitive knowledge includes knowledge about self, task demands and goals, and strategies that can assist in the judgments and regulations of cognitive performances (Flavell, 1979; Veenman, 2016). Composed of broader and oftentimes tacit ideas about the nature and functioning of cognition, metacognitive knowledge is considered part of an individual's belief system and most of the time, it is derived from earlier experiences (Veenman, Van Hout-Wolters, & Afflerbach, 2006). For these reasons, individuals should continually evaluate and modify their metacognitive knowledge (Veenman, 2016). In relation, as Flavell (1979) proposed metacognitive experiences are regulatory feedback mechanisms on metacognitive knowledge. Metacognitive experiences are conscious experiences that "accompany and pertain to any intellectual enterprise" (Flavell, 1979, p.906). They usually occur in situations where highly conscious thinking is stimulated. To master task demands or personal goals, individuals utilize and test their metacognitive knowledge by different means. As Flavell (1979) stated, these means are metacognitive strategies. Metacognitive strategies pertain to planning, monitoring, regulating, and evaluating one's cognition (Veenman, 2016) to achieve demands of a cognitive enterprise (Flavell, 1979).

Embracing all components mentioned so far, metacognition, in fact, is a tool to learn more effectively (Fisher, 2002; Kerndl & Aberšek, 2012). Playing an important role in "reading comprehension, writing, language acquisition, attention, memory, problem solving" (Flavell, 1979, p. 906), metacognition was found as the most important predictor of learning (Veenman, 2016; Wang, Haertel, & Walberg, 1990). Helping individuals perform cognitive acts strategically and efficiently (Gourgey, 1998), metacognition is a major distinction between low and high achievers (Paris & Jacobs, 1984; Pogrow, 2004).

Reading is one of the crucial cognitive acts not only for schooling but also outside classrooms. Reading is a complex and purposeful act of meaning making that involves the actions and interactions of perceptual processes, cognitive skills, and metacognition (Book, Duffy, Roehler, Meloth, & Vavrus, 1985; Doğanay Bilgi & Özmen, 2014; Myers & Paris, 1978). As Flavell (1979) stated, cognitive "strategies are invoked to *make* cognitive progress, metacognitive strategies to *monitor* it" (p. 909 emphasis in original). That is, readers need to employ cognitive strategies to comprehend and gain information from the text (Doğanay Bilgi & Özmen, 2014; Garner, 1987; Gourgey, 2001) and simultaneously, they had better employ metacognitive strategies for the effectiveness of cognitive strategies (Gourgey, 1998, 2001).

Voluminous research examined Flavell's (1979) question; "how much good does cognitive monitoring actually do us in various types of cognitive enterprise?" (p. 910) and found beneficiary findings. In reading, metacognition helps improve vocabulary, reading awareness, skills, comprehension, performance, and responsibility for learning (Boulware-Gooden, Carreker, Thornhill, & Joshi, 2007; Cross & Paris, 1988; Curwen, Miller, White-Smith, & Calfee, 2010; Veenman et al., 2006). In relation, good readers

possess more metacognitive knowledge and employ metacognitive strategies more frequently (Anastasiou & Griva, 2009; Garner & Kraus, 1981; Hartman, 2001a).

Metacognition Training for Reading

Research demonstrated that metacognition can be successfully taught (Anastasiou & Griva, 2009; Cross & Paris, 1988; Ozturk, 2015; Pintrich, 2002; Schraw, 1998; Tanner, 2012; Zohar & Ben David, 2009). When trained for metacognition, students` metacognitive knowledge about themselves as readers, different genres and task demands, and reading strategies increase (Bransford, Brown, & Cocking, 2000; Pintrich, Wolters, & Baxter, 2000; Pintrich, 2002). Moreover, students can learn to plan reading by orienting oneself to task demands and personal goals; monitor comprehension; regulate reading strategies to deal with comprehension failures; interpret and test predictions; evaluate one's cognitive endeavors critically; reflect on comprehension; and evaluate task performance and effectiveness of strategies (Baker & Brown, 1984b; Doğanay Bilgi & Özmen, 2014; Duffy, 1993; Veenman, 2016).

However, it is important to recognize that extant metacognition instruction research has limited influence on classroom students (Carroll, 2008; Curwen et al., 2010; Van Keer & Vanderlinde, 2010; Veenman, 2013a). Students in most mainstream classrooms cannot execute metacognitive control over reading (Veenman, 2013a). That is they are unaware of metacognition and do not reflect on their thinking (Hartman, 2001a).

Barriers to Teaching Metacognition in Mainstream Classrooms

There is a gap between metacognition research and practices (Baker, 2017). The degree to which students are capable of metacognition and the degree to which teachers teach metacognition in the mainstream and research classrooms are not similar to each

other. Reading instruction in schools hardly includes explicit instruction of metacognition; however, there is mostly comprehension testing (Van Keer & Vanderlinde, 2010). In accordance, limited research examining teachers' pedagogies of metacognition reported that teachers' instruction lacks pedagogies of metacognition so as to teach students metacognition (i.e. Bolhuis & Voeten, 2001; Curwen et al., 2010; Duffy, 1993; Fisher, 2002; Kerndl & Aberšek, 2012; Perry, Hutchinson, & Thauberger, 2008; Thomas & Barksdale-ladd, 2000; Zohar, 1999).

With these available pessimistic findings, only few researchers including Duffy, (1993), Kerndl and Aberšek (2012), and Veenman and colleagues (2006) recognized that teachers need tools or explicit directives to teach metacognition in classrooms. However, there is still no initiative to communicate research in a format that teachers can implement similar trainings and foster students' metacognition during their classroom teaching. That is, there is a lack of a pedagogy of metacognition in reading that can help support classroom teachers' metacognition instruction.

Assessing Teachers' Pedagogies of Metacognition

There is sufficient evidence that metacognition can be successfully enhanced through training. However, much of the research on metacognition has been conducted under well-controlled experimental conditions. In such research studies, research-based programs, approaches, methods, or techniques are mostly implemented by the trainers who are often researchers. In such research, as Duffy (1993, 2002) emphasized, the effectiveness of instruction may not simply result from a technique, method, procedure, or program, but from trainers' expertise on teaching students metacognition.

Simultaneously, far less is known about whether and how teachers operating in the dynamic context of the reading classroom can similarly foster students' metacognition. Perhaps one of the reasons little is known about teachers' pedagogical practices that foster metacognition in students has to do with the absence of a research-based, psychometrically sound measure of this phenomenon. Since the early 1990s, teachers' pedagogical practices of metacognition has been examined (e.g. Bolhuis & Voeten, 2001; Curwen et al., 2010; Kurtz et al., 1990; Perry et al., 2008; Thomas & Barksdale-ladd, 2000; Zohar, 1999). However, such research has not exclusively identified the factors representing a pedagogy of metacognition and has not consistently captured them (see Appendix A). For teachers' pedagogies of metacognition, the first critical step would be to engage in a systematic and analytic review of literature to develop criteria for classroom metacognition instruction (Ozturk, 2016) and then validate a psychometrically sound measure identifying teaching metacognition.

Statement of the Problem

Teaching and Learning constitutes two sides of a coin. Neither can be studied independent of the other because teaching and learning inform each other. However, metacognition research has to sacrifice one to understand the target phenomenon better. Since the introduction of metacognition theory in 1979, most studies have focused on students' metacognition. That is, metacognition research mostly examined students' metacognitive characteristics and capabilities and metacognition trainings' impacts on students' metacognition development and performances. However, research on teacher's pedagogical practices of metacognition is limited and it may invite pessimism.

Since the early 1990s, different studies have examined and described teachers whose instruction lacks pedagogies of metacognition. One of the very earliest studies was conducted by Kurtz, Schneider, Carr, Borkowski, and Rellinger (1990). Examining teachers' self-reports, Kurtz et al. (1990) found that "the amount of metacognitive and strategy instruction reported was disappointing" (p.278). Similarly, Zohar (1999) found that teachers' metacognitive declarative knowledge about thinking skills was not satisfactory to be able to teach students the same skills. The initial set of metacognition instruction research also includes Bolhuis and Voeten's (2001), Thomas and Barksdale-ladd's (2000), and Fisher's (2002) studies. These studies also pointed out a lack of pedagogies of metacognition in classrooms.

Following these early findings, second generation studies voiced similar arguments. Perry, Hutchinson, and Thauberger (2008) found teachers often fail to teach metacognition in their classes. Curwen and colleagues' (2010) findings aligned with previous research; they reported that metacognition instruction is missing in most classrooms. It was almost at the end of the second decade of metacognition instruction research, it was found that teachers can talk about and appreciate metacognitive strategies; however, they still experience difficulty in teaching them (Kerndl & Aberšek, 2012).

Despite increasing research on metacognition training, these aforementioned studies seem to cluster around pessimism; teachers' pedagogies of metacognition are not promising. Interestingly, in spite of such findings, only few (i.e. Duffy, 1993; Kerndl & Aberšek, 2012; Veenman et al., 2006) recognized and voiced teachers' need for tools or

explicit directives for metacognition instruction. However, no significant initiative has been taken to improve this problem since 1980s.

In relation to these problems, previous research was approached skeptically to identify how teachers were assessed for their pedagogies of metacognition and whether students` metacognitive adequacy was examined in relation to their instruction. A considerable lack of standardization of instrumentation and lack of specification with teaching metacognition was identified. Previous research utilized various data sources including interviews, classroom observations, field notes, and participants' written work such as tutoring journals, discussion transcripts, reflection reports, and lesson plans. Likewise, data analysis codes varied across each study. Some researchers, especially who utilized grounded theory (i.e. Curwen et al., 2010; Zohar, 1999), even did not report data analysis codes. That is, different studies adopted different codes as the indicators of metacognition instruction. These codes were compiled in a table of frequency order as can be seen in Appendix A.

Moreover, although a set of assessment criteria can be compiled and appreciated as indicators of metacognition instruction, there is a lack of specification. Researchers, except one study (i.e. Bolhuis & Voeten, 2001), did not provide any definitions, descriptions, or directives for the assessment criteria. For example, when teachers were assessed for *providing students with scaffolding*, it was not clear what exactly was scaffolded so as to develop students' metacognition. Although teachers can interpret these indicators to implement metacognition instruction in their classrooms, educating metacognitive students is jeopardized to the extent of teachers' understandings,

inferences, or interpretations. A lack of consistency and specification with metacognition instruction in deed highlights a lack of pedagogy of metacognition.

Moreover, students' metacognitive adequacy was not studied in relation to teacher's instruction. Considering the dynamics between teaching and learning, without analyzing students' metacognitive adequacy or development, only studying teacher's instructional practices via inconsistent criteria and getting to such pessimistic decisions can be inappropriate.

Purpose of the Study

The trends and directions in metacognition-reading research are portrayed in the following figure (Figure 1). Soon after metacognition theory was proposed by Flavell in 1979, it was examined for its characterization in the domain of reading. Characteristics and capabilities of metacognitive readers were identified until the late 1980s. During the following 15 years, various surveys and inventories assessing metacognitive characteristics or capabilities of the readers were developed. Also, since the introduction of metacognition theory, researchers have examined whether metacognition can be taught. Therefore, until the early 2000s various instructional programs, approaches, techniques, and methods were studied and nominated for their effectiveness on students' metacognition.

While research on metacognition instruction and its beneficiary impacts mostly represented by reading scores kept accumulating, it was rarely studied and declared that classroom students could not execute metacognitive control. While this issue requires a critical and systematic examination, concerns regarding teachers' pedagogies of metacognition were declared mostly during the first decade of 2000s. Although teachers' pedagogies have not been assessed by standardized measures and in relation to students'

metacognition and although teachers' need for tools and directives to teach metacognition is still valid, there is not much done in these areas. Therefore, informed by the gaps in the literature and considering teachers' extant needs, this study aims;

a) to develop and describe a pedagogy of metacognition in reading (a PMR) by an extensive, systematic, and analytic review of literature, and then

b) to examine the structural validity of its measurement instrument to identify teaching metacognition in reading classrooms (the ITMR).

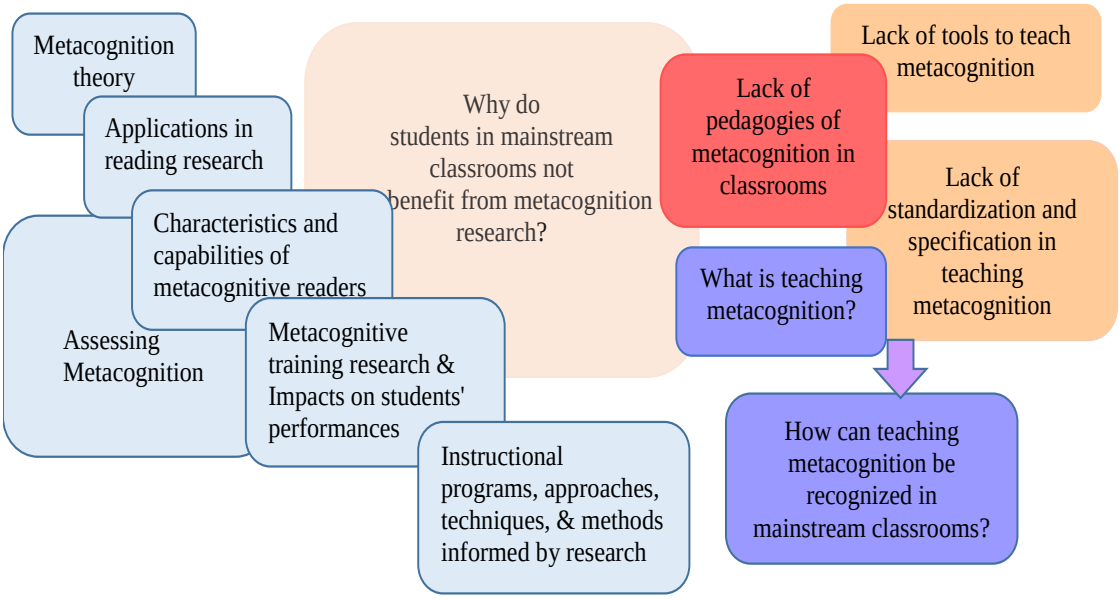

Figure 1. Trends and directions in metacognition research

Rationale for the Study

It is important to define what a pedagogy of metacognition is prior to setting the rationale for this study. The definition of a pedagogy of metacognition was developed by the author following extensive readings and discussions on metacognition, metacognition instruction, metacognition assessment, self-regulation, Socratic thinking, and social perspectives of learning. In addition to scholarly resources, the author benefited from her

teaching and learning experiences besides her observing successful instructors implementing metacognition pedagogy. Therefore, the author defines a pedagogy of metacognition as a form of teaching for which teachers execute their metacognition, effective instructional practices for teaching metacognition, and metacognition assessment by the principles of social learning purposefully to initiate and foster metacognition in students. A pedagogy of metacognition pertains to creating best learning experiences for students' metacognition by teachers' fostering students' metacognitive knowledge, adopting goal-directedness, integrating language of thinking, scaffolding students' strategic reading, encouraging students' independence with strategic reading, assessing metacognition, and prolonging metacognition instruction.

This study is inspired by Schwab's (1978) understanding of education. According to Schwab (1978), education is *someone* teaching *something* to *someone else* in *some context*. It can be formulized as someone + something + someone else + some context = education (Alexander, Murphy, & Greene, 2012, p.17). *Someone* can be teachers, peers, or researchers teaching *something* as in metacognition training research. Meanwhile *something*, which initially referred to the content, recently includes how to learn (Alexander et al., 2012). As Alexander and colleagues (2012) emphasized and metacognition theory proposed, *something* can include procedural, conditional, and self-regulatory knowledge of when to use cognitive strategies and how to plan cognitive acts, monitor and control cognition, and why to evaluate cognitive processes and products. It can also include regulatory strategies; planning, monitoring cognition, regulating resources to meet task demands, and evaluating task performance. *Someone else* pertains to learners. Considering metacognition theory, developmental and individual differences

add complexity to this variable. Finally, *some context* is another variable; however, it is controversial regarding importance. Some educational psychologists argue that context does not matter, at all (Alexander et al., 2012). Still, nature of the context and classroom climate might be potential facets of this variable. For metacognition instruction, for example explicit instruction, modeling, cooperative work, scaffolding, and feedback can be named for this category.

A pedagogy of metacognition recognizes Schwab's education equation and accepts that each variable can have multiple facets. However, as Alexander and colleagues (2012) stated, the effects of these variables are not additive, rather they are multiplicative; "Education= Someone x Something x Someone else x Some context" (Alexander et al., 2012, p. 19). For this reason, variation in *someone* leads to distinctively different educational experiences and outcomes even if other variables are relatively kept constant. As depicted in the problem section, teachers' pedagogies might lack pedagogies of metacognition while researchers oftentimes orchestrate metacognition instruction in classrooms for research purposes. Therefore, these different facets of *someone* can lead to the distinctive discrepancy between research and classroom realities. A pedagogy of metacognition aims to minimize the variations in educational outcomes by empowering classroom teachers' understandings and practices of metacognition instruction.

A pedagogy of metacognition aims to extend beneficiary metacognition instruction to larger contexts. Metacognition research has been revealing concerns about teachers' pedagogies of metacognition instead of identifying and specifying core practices for such instruction. Description of the extant problems is important; however, as researchers including Duffy (1993), Kerndl and Aberšek (2012), Veenman et al.

(2006), and Griffith and Ruan (2005) emphasized, the need for an adequate knowledge base on metacognition instruction is acute. In order for students to be metacognitive, teachers must know how to guide learning (Bowman, Galvez-Martin, & Morrison, 2005; Kurtz et al., 1990). Therefore, to support teachers' understanding of metacognition instruction, development and description of an extensive literature-based pedagogy of metacognition is compulsory.

Development of a pedagogy of metacognition is also important to empower teachers' instructional autonomy rather than imposing established programs, procedural approaches, methods, or techniques on their classroom teaching. Reviewing different instructional practices that aim to initiate or foster students' metacognition, Duffy (2002) emphasized that "research focus must be on thoughtfully adaptive teaching" (p. 36). By this, Duffy (2002) means that instead of searching for "foolproof" (p. 36) instructional techniques, research thereafter should focus on teachers who would possess and improve a mindset of being metacognitive. Metacognition training research has already revealed a set of programs, approaches, techniques, and methods that can help to foster students' metacognition. However, the availability of such an instructional repertoire seems not to be supportive enough. Moreover, as Duffy, Miller, Parsons, and Meloth (2009) and Paris and Winograd (1990) argued, classrooms produce unpredictable situations and implementation of established procedures, programs, and instructional methods or techniques may not be always feasible. The effectiveness of such procedures may not be guaranteed for all classrooms, either. Therefore, instead of establishing new instructional procedures or highlighting certain techniques, a pedagogy of metacognition will conceptualize what it means to teach metacognition so as to support teacher's

instrumental role in delivering metacognition instruction as suggested by Duffy (1993), Fisher (1998), Hartman (2001b), Jones (2007), and Papleontiou-louca (2003).

A pedagogy of metacognition pertains to creating best learning experiences to facilitate and empower students' metacognition. However, to argue whether a teacher can implement a pedagogy of metacognition, evidence of efficacy is needed. For this reason, observable and measurable criteria should be developed and validated so that future research can study teaching and learning metacognition simultaneously by standardized criteria. In the interest of this research, behavioral indicators implementing a pedagogy of metacognition technically describe teaching metacognition.

Development of a measure is, indeed, a priority due to a lack of psychometrically sound measure of classroom metacognition instruction. After a review of the literature, Wilson and Bai (2010) concluded that there was no instrument for teachers' metacognitive knowledge and instructional strategies. Wilson and Bai (2010), therefore, created a Teacher Metacognition survey. This single instrument, however, only indicates "participants know what is right" (Wilson & Bai, 2010, p. 286). Although teachers can communicate their knowledge about metacognition and name effective instruction, teachers may still not (be able to) teach it (Kerndl & Aberšek, 2012). In addition to Chomsky's (2014) proposition that without performance assessing competence is difficult, this research also proposes that assessing competence might not always estimate performance. Therefore, a measurement instrument is compulsory to identify teachers' pedagogical practices of metacognition in classrooms.

The measurement instrument of teaching metacognition is a self-report measure. Although some criticism might arise for this characteristics, as Ewijk, Dickhäuser, and

Büttner (2013) emphasized, examining teachers' self-reports is important. The measure can be a valid indication for whether and how teachers interpret a pedagogy of metacognition, if at all. It can also help describe weather and why teachers fail to promote students' metacognition as voiced in the research especially when studied in relation to students` metacognition adequacy. Validation procedures and psychometric properties of the measure will be presented in the later sections of this dissertation study.

Research Questions

As discussed so far, a better understanding of metacognition instruction and its identification in mainstream classrooms is an important research area. Therefore, this study will answer the following research questions:

1) By an extensive, systematic, and analytic review of literature, what does a pedagogy of metacognition in reading entail?
2) Following, what are the structural properties of a measure developed to identify teaching metacognition in reading classrooms (the ITMR)?

Theoretical Framework and Domain of the Study

Theoretical framework. A pedagogy of metacognition and its measure is situated in the social realm of learning. For teachers' instrumental role in developing and fostering students' metacognition, social cognitivist theories; Bandura's (1971, 1986) observational learning, Zimmerman's self-regulated learning (2002; 2000; Zimmerman & Kitsantas, 1997), and social constructivist principles; Vygotsky's (1978) private and inner speech, zone of proximal development, and scaffolding will be reviewed in the second chapter of this paper.

Domain of the study. This study will situate a PMR and the ITMR in the domain of reading regarding the theoretical foundations and practical implications as will be discussed in the following.

Similar to Bransford et al. (2000) who argued that metacognition is "not generic" (p.19), many researchers agreed that metacognition's manifestations is context dependent (Zimmerman, 2000) or substantially domain-specific (Papleontiou-louca, 2003; Schraw, 2001; Tishman & Perkins, 1997; Veenman, 2016). That is, individuals for example, can know about and benefit from regulatory skills for math; however, they might not be able to automatically transfer them into reading and use them to accomplish specific reading-oriented tasks. Moreover, cognitive strategies used in math may be different than the strategies for reading comprehension. Therefore, metacognitive monitoring, regulating, and evaluating and in relation its products might show some distinctive characteristics in each domain. For this reason, teaching metacognition in reading might be slightly different than teaching metacognition in any other domains. Individuals can, therefore, recognize relevant processes in each domain rather than assuming learning is the same everywhere (Veenman, 2016).

A PMR and the ITMR should be domain-specific with regards to research implications or educational practices. While Sperling, Howard, Miller, and Murphy's (2002) argued that "domain-general measure of metacognitive processes loses its predictive power" (p.74), Neuenhaus, Artelt, Lingel, and Schneider's (2011) study confirmed this proposition. Neuenhaus et al. (2011) found that domain-specific metacognition has a higher explanatory power regarding the achievement in a particular domain than general metacognition. That is, tuning metacognitive skills to domains can

characterize expertise in the target domain (Veenman, 2016). Therefore, especially to harmonize teaching and learning and to examine the predictive validity of the ITMR, metacognition pedagogy and its measure should reflect domain-specific features. By so, classroom metacognition instruction and its effectiveness can be analyzed holistically.

Conceptual Definitions

Metacognition. Metacognition pertains to thinking about thinking. By self-appraised knowledge about cognition, individuals can self-regulate their thinking to accomplish tasks (Baker & Brown, 1984a; Cross & Paris, 1988; Flavell, 1979; Schraw, 1998; Veenman et al., 2006).

Defining metacognition with regards to reading is important for the development of a PMR and the ITMR. For this purpose, various definitions including Cross and Paris's (1988), Flavell, (1979), Ozturk, (2016), Schraw, (1998), Samuels, Ediger, Willcutt, and Palumbo's (2005), Baker's (2005), and Veenman and his colleagues' definitions (2006) were reviewed. Metacognition in reading pertains to one's knowledge about and regulation of reading for successful comprehension or task performance.

Metacognitive knowledge. It is a component of metacognition. Knowledge about cognition includes the variables about thinking and the sensitivity to act accordingly (Flavell, 1979). It pertains to individuals' declarative, procedural, and conditional knowledge about self, cognition, cognitive strategies, and task variables (Flavell, 1979; Pintrich, Wolters, & Baxter, 2000).

In reading, knowledge about cognition includes variables impacting comprehension or task-performance. Knowledge about reading pertains to one's

knowledge about self as a reader, reading, reading strategies, tasks, different topics, text structures and genres, and the compatibility among these variables.

Metacognitive experiences. Metacognitive experiences are conscious intellectual enterprises that usually occur in situations of highly conscious thinking (Flavell, 1979). They are mechanisms that add, delete, and modify metacognitive knowledge and help activate strategies for cognitive enterprises.

With regards to reading, metacognitive experiences pertain to strategic reading experiences. Strategic reading requires individuals' active thinking for and reflective engagement in reading so as to construct meaning, to achieve a reading-goal, or to perform a task successfully.

Metacognitive regulation. Regulation of cognition is the executive function or higher order processing orchestrating and directing cognitive skills (Paris, Cross, & Lispon, 1984). It includes metacognitive strategies enacting regulatory mechanisms over cognition for successful task completion by planning, monitoring and regulating, and evaluating cognitions (Baker & Brown, 1984b; Kuhn, 2000).

In reading, metacognitive regulation can be captured by metacognitive strategies orchestrating cognitive strategies for successful comprehension or task performance.

Cognitive strategies in reading. Cognitive strategies involve direct interaction with the text and operate on oncoming information directly (Afflerbach & Cho, 2009; Anastasiou & Griva, 2009). Reading strategies can be classified as in the following; overviewing the text, underlining, using titles, note taking, using dictionaries, identifying or determining word meanings, guessing from the context, activating and using prior knowledge, visualization, using contextual and linguistic clues, skimming, scanning,

rereading, finding main ideas or important information, summarizing, identifying categories of information, asking questions, making and predictions or inferences, revising predications, making connections within and across texts, reconsidering or revising prior knowledge, synthesizing information, reacting critically to what is read, anticipating or planning for the use of new knowledge, recognizing an author's writing style and carrying on responsive conversation with the author, evaluating the qualities of text, revising and editing a piece of writing (Afflerbach, Pearson, & Paris, 2008; Anastasiou & Griva, 2009; Blair, Rupley, & Nichols, 2007; Ness, 2016; Pressley & Afflerbach, 1995).

Metacognitive strategies in reading. Metacognitive strategies manifest in reading as planning reading, checking whether the text is making sense, controlling and regulating cognitive strategies, taking appropriate steps toward achieving comprehension or task demands, and evaluating the effectiveness of strategies, comprehension, or task performance.

Pedagogy of metacognition. It is a form of teaching for which teachers utilize their metacognition, effective instructional practices for teaching metacognition, and metacognition assessment by the principles of social learning purposefully to initiate and foster metacognition in students.

A pedagogy of metacognition pertains to creating best learning experiences for students' metacognition. It can be recognized by teacher's fostering students' metacognitive knowledge, adopting goal-directedness, integrating language of thinking, scaffolding students' strategic reading, encouraging students' independence with strategic reading, assessing metacognition, and prolonging metacognition instruction.

Reading. Reading is a complex and purposeful act of meaning making that involves the actions and interactions of perceptual processes, cognitive skills, and metacognition (Book et al., 1985; Doğanay Bilgi & Özmen, 2014; Myers & Paris, 1978).

Skill. Skills are automatic actions that help individuals perform with "speed, efficiency, and fluency and usually occur without awareness of the components or control involved" (Afflerbach et al., 2008, p.368). Individuals do not have to make conscious decisions for skills; they operate out of habit.

Strategy. Strategies are deliberately controlled and goal-directed operations employed by the individuals for facilitated performances (Afflerbach et al., 2008; Pressley, Harris, & Marks, 1992). Strategies include "cognitive, metacognitive, and behavioral processes" that individuals use for their purposes (Chambers, Almasi, & Rintamaa, 2017, p.133). In time, individuals can gain fluency with strategies and effortful strategies can transform into skills.

Teaching metacognition. It pertains to observable and measurable indicators which capture teachers' implementation of a pedagogy of metacognition in the classroom.

Overview of the Study

In this chapter, background to the study, extant problems, purpose, rationale for the study, research questions, theoretical framework and domain of the study, and conceptual definitions were presented. The following chapter is allotted to review literatures.

Literature review section will cover metacognition theory, characteristics and capabilities of metacognitive readers, surveys and inventories for assessing students'

metacognition, and metacognition instruction in the domain of reading. Since a competent model's instrumental role in developing and fostering students' metacognition is recognized in metacognition instruction research, some learning theories or principles from the social realm will be reviewed to best-identify teaching metacognition. Then, literature on assessing teachers' pedagogies of metacognition will also be reviewed to compare core practices of teaching metacognition identified in this study. In this section, limitations of available measures and procedures will also be discussed. By this comprehensive review of literatures, the first research question will be answered. A pedagogy of metacognition in reading (PMR) will be proposed. In this section, the author will identify the dimensions of a PMR and then describe them from a teacher's perspective. Since this research follows a unique evolving pattern, in the following (Figure 2), steps taken to answer the research questions are presented for the reader.

The method chapter will present procedures that helped to answer the second research question in this study. It will include the following sections; research design, participants, scale development, data collection, and data analysis. In chapter four, the second research question will be answered; the ITMR will be constructed by an exploratory factor analysis (EFA) and internal consistency reliability statistics (Cronbach's Alpha) will be presented. Moreover, the findings of item- and dimension-level mean difference comparisons along with the correlations among the dimensions of the ITMR will be presented to illustrate the congruence of the instructional practices across the elementary grades.

Chapter five will present a brief summary of the findings, significance, and contributions of this study to the literature. Discussions will focus on the contrast

between the ITMR and the literature and the congruence of the instructional practices across the grades. Several research implications contributing to the validity and educational utility of the ITMR will also be recommended in this section. Some educational implications will be presented to support both in-service and pre-service teachers' understanding or implementation of metacognition instruction. Then, limitations of this research will be presented not to lead any researchers or educational practitioners to misuse the ITMR.

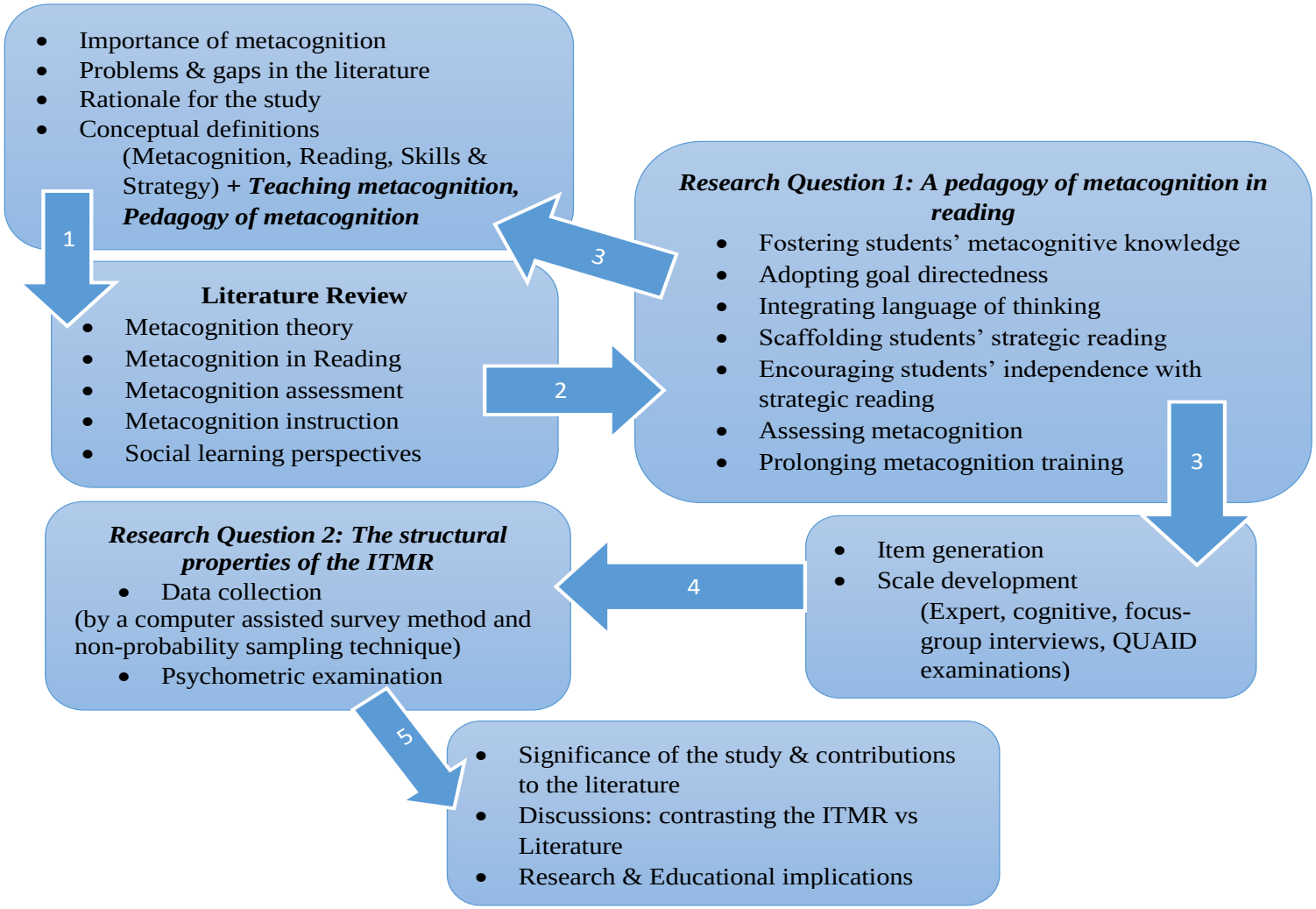

Figure 2. Flow of the study

CHAPTER 2: LITERATURE REVIEW

This study aims to contribute to understanding metacognition instruction and specifying teaching metacognition in the domain of reading. For this purpose, literature informing the development of a pedagogy of metacognition in reading (PMR) and its measure (ITMR) will be reviewed in the following. Before reviewing the literature, I should first discuss my motivations for this study by disseminating my epistemological orientations and adjacent personal philosophies as they determine my approach to the phenomenon and influence my research.

Lenses Imposed on the Research

In this section, I will reveal how and why I approach the phenomenon of this research. As a researcher, I am impressed by logical positivism; I believe knowledge is driven from sensory evidence, interpreted through logic and reason, and verified through empiricism. I value forming concepts and principles on the basis of evidence, check ideas for the consistency with reality, evaluate patterns across and within cases, and correct any contradictions by reasoning. I also believe a theory of knowledge can be achieved by empiric verification.

As a teacher, I lean on humanism. I believe my primary role is to create opportunities and provide tools for my students, so that they develop autonomy and agency not only for their learning but also for their -*own*- life. By reminding "fundamental" rights; personal freedom, choice, and responsibility, I do my best for my students' self-actualization. In contrast to my researcher-identity, I, personally, define myself as an existentialist. Although human reason has its boundaries, I still encourage and help my students question themselves and their engagements; therefore, they do not

confine themselves within everyday experiences, accept common presuppositions or routines, and suppress their feelings. I remind that each choice carries its responsibility and potential consequences. I talk to my students that they are the only responsible agents to determine their own development through free-will. It is only themselves who can give meaning to life and realize their *true essence*.

As an individual, I feel responsible for the equalization of the resources and goods for all. I feel responsible for empowering others. I think that an individual who has opportunities and capabilities to reach knowledge should be a distributor to accelerate the youths' collaborative awareness and motivation for a just social system. Lastly, I believe in peace and love. We, human beings, are magnificent in all essences. I believe our capability to think will make a difference for the good. If we question our tendencies, values, actions, and their consequences, we can create a world where no child dies for any political, social, economic, or religious reasons. If we can question whether any materials are much more valuable than a human being, we will fuel the flow of change for good.

At this stage of my personal and academic development, my fundamental questions are as in the following; What can we -teachers- *do* to educate individuals who think and take responsibility for the human-advancement? How can teachers educate metacognitive individuals? How can teaching metacognition be identified and implemented practically? To answer these questions, I pursue this dissertation study.

In the following, literature composing the essence of this study will be reviewed with regards to the domain of reading. For this purposes, literature was searched for the following keywords: metacognition, metacognitive capabilities, metacognitive strategies,

metacognitive skills, thinking, thinking about thinking, goal-setting, goal-directed behavior, metacognitive reading, strategic reading, self-monitoring, self-regulated learning, constructively responsive reading, verbal protocols, thinking aloud, development of metacognition, teaching metacognition, modelling metacognition, metacognitive training, reciprocal teaching, transactional strategies instruction, cognitive apprenticeship, cognitive disequilibrium, gradual release of responsibility, metacognitive assessment, reading self-assessment, Socratic questioning, assessing teachers' metacognition, assessing teaching metacognition, assessing teachers' knowledge about teaching metacognition, and assessing teachers' pedagogies of metacognition.

The fundamental understanding of "being metacognitive" will be derived from metacognition theory. Metacognition's manifestations in reading will be portrayed by research-based characteristics and capabilities of metacognitive readers. Moreover, literature on assessing students' metacognition in reading will be reviewed. Regarding assessment's role in informing and improving instruction, indicators that students are expected to develop or master for metacognitive adequacy in reading will be formalized and confirmed. This section is important for its insights that clarify the goal of a PMR. Following, metacognition instruction literature in reading will be deconstructed for the main components of metacognition instruction, specification with teaching metacognition, and teachers' instrumental role in developing students' metacognition, if possible at all.

Review of the literature especially on metacognition instruction will help to identify various effective programs, approaches, methods, and techniques to teach metacognition. However, still considering the discrepancies between mainstream and

research classrooms and concerns regarding teachers' pedagogies of metacognition, this study recognizes a need for specifying and describing teaching metacognition in relation to a mediator's instrumental role in learning as Duffy (1993) and Blair et al. (2007) emphasized. For these purposes, social cognitivist and social constructivist perspectives of learning will also be reviewed. This is not only because empirical research on metacognition instruction has mostly been situated in cognitivist realm of learning but also because research on metacognition training and assessing pedagogies of metacognition recognizes a competent model who delivers metacognition instruction. Moreover, literature on assessing teachers' pedagogies of metacognition will be reviewed. By this review, core practices of metacognition instruction that teachers are assessed for will be contrasted to instructional practices implemented for metacognition training. Then, literature-informed instructional practices will be harmonized to inform a pedagogy of metacognition in reading (PMR).

A PMR will describe teachers' orchestrating instruction and creating best learning opportunities for students' metacognition. A pedagogy of metacognition will present dimensions of classroom metacognition instruction from a teacher's perspective; therefore, teacher-behavior that can promote and foster metacognition in students will be identified and described.

Metacognition Theory

Flavell (1979) has been credited for introducing the concept of metacognition. However, metacognition can be traced back to Aristotle (Van Overschelde, 2008). In relation, Piaget's conceptualization of formal operations, where higher order thoughts operate on lower order, is considered early traces of metacognition in educational

psychology. As Inhelder and Piaget (1958) described, formal operations pertain to thinking about thought and to thought about an external reality. Scrutinizing Inhelder and Piaget's (1958) ideas, Flavell (1977) stated that "formal operation constitutes a kind of metathinking that is, thinking about thinking itself rather than about objects of thinking" (p.126). In relation to these foundations, Flavell (1979) defined metacognition as one's "knowledge and cognition about cognitive phenomena" (p 907). That is, as Veenman, Van Hout-Wolters, and Afflerbach (2006) stated, metacognition is "a higher-order agent overlooking and governing the cognitive system, while simultaneously being part of it" (p.5).

Before discussing components of metacognition and reciprocal relation among them, understanding the two-way metal processing of cognition and metacognition is important to eliminate misinterpretations, if there are any. For this reason, Nelson's (1996) Metacognitive Model of consciousness and cognition will be reviewed in the following. Nelson's (1996) Metacognitive Model of consciousness and cognition distinguishes object-level (cognitions concerning external objects) and meta-level (cognitions concerning cognitions of external objects) processes to describe the functions of metacognition. In this model, monitoring and control are essential acts. Monitoring refers to the assessment of particular cognitive processes and it provides feedback on the success or failure of these processes. However, monitoring cannot be helpful if individuals do not or cannot direct ongoing cognitive processes. Control, therefore, becomes indispensable and it pertains to the decisions and behaviors enhancing cognitive processing and products. Depending on an individual's decisions, control behaviors that include time allocation, strategy selection, and search termination are adopted and

adapted (Nelson, 1996). Nelson (1996) also highlighted that monitoring and control are highly interactive. Indeed,

> Information about the state of the object-level is conveyed to the meta-level through monitoring processes, while instructions from the meta-level are transmitted to the object-level through control processes. Thus, if errors occur on the object-level, monitoring processes will give notice of it to the meta-level and control processes will be activated to resolve the problem (Veenman et al., 2006, p. 4).

To understand these operations better, components of metacognition benefit from explication. As Flavell (1979) argued, one's capable control depends on some factors that include " (a) metacognitive knowledge, (b) metacognitive experiences, (c) goals and tasks, (d) actions (or strategies)" (Flavell, 1979, p. 906). Metacognition theory, indeed, presents these factors under three categories known as knowledge about cognition, metacognitive experiences, and regulation of cognition.

Metacognitive knowledge. Knowledge about cognition includes variables about thinking and the sensitivity to act accordingly (Flavell, 1979). It pertains to individuals' "declarative, procedural, and conditional knowledge about cognition, cognitive strategies, and task variables that influence cognition" (Pintrich, Wolters, & Baxter, 2000, p. 45). *Declarative knowledge* pertains to "what is known in a propositional manner" (Jacobs & Paris, 1987, p.259). It involves one's understanding of *what* influences cognitive activity as a byproduct of interaction among person, task, and strategy variables (Veenman et al., 2006). Knowledge about self pertains to the awareness and knowing about one's own nature and nature of others as cognitive processors (Flavell, 1979). It includes beliefs and understandings about the self, intra-individual and inter-individual differences, and universals of cognition (Flavell, 1979; Pintrich et al., 2000). Knowledge about the task pertains to how task variations and demands can influence one's cognition and

performances (Flavell, 1979). Finally, knowledge about strategies can include "various procedures and strategies for cognition including memorizing, thinking, reasoning, problem solving, planning, studying, reading, writing, etc." (Pintrich et al., 2000, p. 46). It also includes knowledge about strategies' effectiveness in achieving goals of cognitive undertakings (Flavell, 1979).

Within the same category of metacognitive knowledge, there is *procedural knowledge*. It pertains to "an awareness of processes of thinking" (Jacobs & Paris, 1987, p.259) and "an appreciation for *how* skills operate or are applied" (Cross & Paris, 1988, p. 131). As Pintrich et al. (2000) and Paris, Cross, and Lipson (1984) highlighted, knowing about various strategies like summarizing, underlining, or making inferences and knowing how to use them is crucial for individuals. However, procedural knowledge on itself might not be sufficient since one may not know when and why to use these strategies appropriately. Individuals, therefore, need to develop a repertoire of conditional knowledge.

Conditional knowledge pertains to an awareness of the conditions that influence one's cognition and performances (Jacobs & Paris, 1987). Conditional knowledge helps one to know *when* and *why* to use strategies (Jacobs & Paris, 1987). For various conditions, situational task variables, and task demands, individuals need to adopt most appropriate strategies effectively or adapt them by the costs and benefits of these strategies (Paris et al., 1984).

According to Flavell (1979), metacognitive knowledge can help individuals to "select, evaluate, revise, and abandon cognitive tasks, goals, and strategies in the light of their relationships with one another" and with one's abilities and orientations regarding

the cognitive tasks (Flavell, 1979, p. 907). However, metacognitive knowledge can be inaccurate or individuals might fail to activate it when needed, it can fail to have an influence on cognition when activated, or it can fail to create a beneficial effect (Flavell, 1979). This could be understood when individuals make use of metacognitive knowledge to fulfill task demands; that is, when they experience their knowledge.

Metacognitive experiences. Recognizing the importance of metacognitive knowledge on cognitive performance, Flavell (1979) argued for its practical utilization. For this, Flavell (1979) proposed metacognitive experiences and defined metacognitive experiences as conscious intellectual enterprises that occur in the contexts where "highly conscious thinking" (p. 908) is stimulated and where "quality control" over thinking is ensured (p.908). Such kind of experiences may be observable for example, at schools where students carefully plan their approaches to cognitive enterprises and evaluate their steps of goal fulfillment afterwards. Flavell (1979) proposed that metacognitive experiences are the "items of metacognitive knowledge that have entered consciousness" (p. 908).

Metacognitive knowledge and experiences constitute overlapping sets. That is, metacognitive experiences are the substantial alimentative, regulatory, and modifying mechanisms for metacognitive knowledge. By experiences, individuals can add to, delete from, or revise metacognitive knowledge base. In relation, metacognitive experiences can impact cognitive goals and task engagements. By evolving metacognitive knowledge, individuals can adapt their goals or adopt new goals since they might have experienced for example, failure or puzzlement (Flavell, 1979) or on the contrary, success and satisfaction with their goal-mastery or task performance.

Metacognitive experiences are also important for strategy-activation either at cognitive or metacognitive level (Flavell, 1979). As stated earlier, cognitive strategies are necessary to make progress while metacognitive strategies are indispensable to monitor the progress. The connection between these two levels of cognition can be ensured by the familiarity, expectations, or assumptions that are stimulated by previous metacognitive experiences. Encountered with task demands, individuals might expect for example, the task will be difficult or interesting to achieve. Related metacognitive experiences help individuals connect to metacognitive knowledge and select appropriate cognitive strategies. Individuals' monitoring their approaches to the goals help trigger additional metacognitive experiences about how the task is progressing (Flavell, 1979). Therefore, metacognitive experiences both inform the extant metacognitive knowledge and are informed by the same repertoire.

Without metacognitive experiences, that is without being translated into action, metacognitive knowledge can remain subjective, personal, and tacit (Jacobs & Paris, 1987; Veenman, 2016). Therefore, as Veenman (2016) highlighted, metacognitive knowledge needs to be utilized and tested by the execution of skills.

Metacognitive regulation. Metacognitive strategies pertain to regulation of cognition. These strategies include planning, monitoring and regulation, and evaluation of cognition (Schraw, 1998). First of all, planning pertains to goal-setting that can guide cognitions (Jacobs & Paris, 1987) and help with monitoring them in particular (Pintrich et al., 2000). Planning involves making predictions, allocating resources and time, selecting and sequencing appropriate strategies, and allocating attention selectively before a task (Schraw, 1998) so as to optimize task performance (Paris et al., 1984).

Individuals' engagement in monitoring and adapting their strategies to follow a chosen plan is known as regulation. These strategies are more process-oriented components of metacognition (Paris et al., 1984; Pintrich, 2002). Pintrich et al. (2000) stated that it is not easy to demonstrate monitoring and regulating separately while Pressley and Afflerbach (1995) demonstrated that monitoring cognition and regulating cognitive activities occurs simultaneously through verbal-protocols. For the purpose of clarity, monitoring and regulating are conceptually distinguished from each other in the following.

Monitoring pertains to one's online awareness of ongoing cognitive activities and task-performance (Pintrich et al., 2000). It is generally accompanied with metacognitive judgments: (a) ease of learning judgments (EOL), (b) judgments of learning (JOL), (c) feeling of knowing (FOK), and (d) confidence judgments (CJ). EOL judgments that draw on metacognitive knowledge of the self and the task help determine the level of difficulty to remember or to learn the material. JOL manifest themselves in numerous forms while a cognitive activity is in process. Individuals might ask themselves questions to actively monitor their cognitive processes and products or to determine whether they will be remembering the information later for example, for a test. Moreover, FOK pertains to tip-of-the-tongue phenomenon and occurs while a person tries to recall something (Pintrich et al., 2000). Nelson and Narens (as cited in Pintrich et al., 2000) explained that FOK generally emerges after one's failure to remember some information but involves a determination to recall it later. Lastly, CJs come after the retrieval of the information and when a response or behavior is enacted. CJs reflect individuals' metacognitive awareness

and monitoring because individuals are asked to rate the correctness of their cognitive performances and the calibration of these judgments to their actual performances.

While monitoring pertains to assessing cognitive processes and performance indicators, regulation refers to changing cognitions and behaviors to match personal goals or task demands (Ozturk, 2016; Pintrich et al., 2000). Taken together planning, choosing and using different strategies in alignment with the resources like time and personal pace of learning, resources allocation, volitional control; the ability to monitor and regulate cognition plays an important role on performance (Pressley & Afflerbach, 1995).

Lastly, evaluation pertains to appraising the efficacy and products of one's cognitive enterprises (Schraw, 1998). A goal-directed cyclical process (Jacobs & Paris, 1987), evaluation is a measure against a standard to determine "the task difficulty relative to one's abilities… [or] relative effectiveness of different strategies" contributing to task performance (Paris et al., 1984, p.1241). Referring back to Nelson's (1996) model, as Flavell (1979), Schraw (2001), and Veenman et al. (2006) highlighted, it is important to recognize that metacognitive knowledge, experiences, and skills are interactive in nature and help control and monitor cognitive enterprises (see Appendix B).

Metacognition in Reading

Metacognition's role in reading pertains to individuals' knowledge about reading and regulation of reading to accomplish task demands (Garner, 1981, 1987; Pressley, 2002). Metacognitive readers "have a strong sense of 'meaningfulness' of reading" (Gourgey, 1998, p. 84). They see knowledge as organized set of concepts rather than isolated facts (Long & Long, 1987). Metacognitive readers try to understand meanings and relationships by actively interacting with the text (Gourgey, 2001). As Anastasiou

and Griva (2009) found, they especially utilize meaning-oriented reading. For metacognitive readers, comprehension is satisfying and productive (Duke & Pearson, 2008).

Metacognitive readers are aware of text features and structures (Pressley & Afflerbach, 1995) and they know that each reading task can require different approaches (Duffy et al., 1987; Gourgey, 2001; Kurtz et al., 1990; Zimmerman, 2002). They understand the nature of reasoning about text, engage in thoughtful and adaptive reasoning, and control it (Duffy, 1993). As Pressley and Afflerbach (1995) found, metacognitive readers are selectively attentive to their reading (Anastasiou & Griva, 2009); they can manifest their knowledge of a variety of cognitive and metacognitive strategies (Afflerbach & Meuwissen, 2005; Pressley & Afflerbach, 1995). Moreover, metacognitive readers value transferring their skills to new task situations and use them purposefully for new task demands (Anastasiou & Griva, 2009; Zimmerman, 2002).

Furthermore, metacognitive readers are also aware of their own characteristics (Gourgey, 1998, 2001). They are aware of their weaknesses and strengths as readers (Pressley & Afflerbach, 1995; Zimmerman, 2002). They know the importance of self-questioning and do self-assessment (Afflerbach & Meuwissen, 2005; Gourgey, 1998, 2001; Palinscar & Brown, 1984).

Metacognitive readers undertake some steps preparing themselves for the upcoming reading activity. They set purposes to read and activate relevant prior knowledge (Anastasiou & Griva, 2009). They preview the text; they note context and review text structure and sections as they might be relevant to their reading goals (Anastasiou & Griva, 2009; Jacobs & Paris, 1987; Pressley & Gaskins, 2006).

Previewing task demands, metacognitive readers can define the nature of the task, set standards of successful reading, make some predictions, determine most useful strategies, and allocate resources such as time and other instructional aids (Afflerbach & Meuwissen, 2005; Anastasiou & Griva, 2009; Gourgey, 2001).

While reading, metacognitive readers monitor and regulate both their comprehension and strategy use to achieve task demands and personal goals. Unlike immature readers, who may have difficulty managing their cognition while reading (Baker & Brown, 1984a, 1984b; Duffy, Roehler, & Herrmann, 1988) and who may lack an understanding of strategic reading (Duffy et al., 1987), metacognitive readers are active and flexible in task analysis, monitoring comprehension, and regulating resources (Baker & Brown, 1984a, 1984b; Jacobs & Paris, 1987; Zimmerman, 2002). They can adjust their rate of reading, level of cognitive processing, and standards of meaning making according to tasks demands and text features (Jacobs & Paris, 1987). Metacognitive readers selectively and continually make decisions about their comprehension by checking their interferences and predictions and align their understanding of the text content and prior knowledge. For this purpose, metacognitive readers simultaneously use a set of cognitive and metacognitive strategies, coordinate, and shifts them when appropriate and necessary (Afflerbach & Cho, 2009; Baker & Brown, 1984a, 1984b; Duffy, 1993). Metacognitive readers, for example, can reread some sections, think about particular ideas, slow down, take notes, anticipate test questions, paraphrase, summarize, relate text to their experiences, construct images, identify categories of information, and engage in arguments with themselves about the meaning (Jacobs & Paris, 1987; Pressley & Afflerbach, 1995). As Long and Long (1987)

and Pressley and Afflerbach (1995) stated, they also engage in self-questioning. While they question their understanding, they engage in active thinking; they generate and use their own feedback for comprehension (Anastasiou & Griva, 2009; Gourgey, 2001) and strategy-use (Gourgey, 1998).

Following reading, metacognitive readers do self-assessment of strategic reading. Metacognitive readers think about whether and how new knowledge fits in their previous learnings and whether and how they can use the knowledge in the future (Pressley & Gaskins, 2006). That is, they react to the text intellectually (Baker & Brown, 1984a; Duke & Pearson, 2008). They also think about how to transfer strategies for the future performances (Anastasiou & Griva, 2009; Gourgey, 2001; Zimmerman, 2002). They self-assess the efficacy of strategic reading experiences.

Identifying the characteristics and capabilities of metacognitive readers is essential to determine the instructional goals of a pedagogy of metacognition. For this purpose, characteristics and capabilities that students are to develop at the end of a metacognition instruction period was compiled in a complete list (see Appendix C). To cross-check these characteristics and capabilities, in the following metacognition assessment practices will be reviewed.

Metacognition Assessment in Reading: Measurement Instruments and Focus

Metacognition assessment practices can be categorized into three: interviews, surveys and inventories, and think-aloud protocols (Paris & Flukes, 2005). To the interest and purpose of this research, in the following surveys and inventories will be elaborated. Because surveys and inventories "focus more on the assessment of targeted reading behaviors" (Israel, 2007, p.57), metacognition assessment tools were utilized to validate

readers' characteristic and capabilities presented in the previous section and to inform a PMR about the expected learning outcomes in this research. The following section will present several types of surveys and inventories to assess students' metacognition in the domain of reading in a chronological order.

Index of Reading Awareness. Jacobs and Paris (1987) designed the Index of Reading Awareness (IRA) for the children in third to fifth grades with reading abilities from second to seventh grade. Following their earlier open-ended interview study (see Paris & Jacobs, 1984), Jacobs and Paris (1987) developed a 40-point self-report scale that has 20 multiple choice questions with 3 options to assess individuals' awareness of metacognitive strategies. In addition, they devised a fourth category that measured children's conditional knowledge about how specific strategies help various reading goals.

The IRA intends to measure children's knowledge about reading and their abilities with three aspects of metacognitive strategies: planning reading for specific purposes, monitoring progress while reading, recruiting fix-up strategies, and evaluating tasks, goals, and personal skills. Although Jacobs and Paris (1987) grouped the items into four subscales of evaluation, planning, regulation, and conditional knowledge, factor analyses did not support their conceptual subscales. Therefore, only the total of IRA is to be used for data analyses.

Jacobs and Paris (1987) lastly stated that the IRA is an objective test that is sensitive to changes stemming from individual differences in age, sex, and reading ability. It can help with differentiating children who know about metacognitive strategies and who do not.

Metacomprehension Strategy Index. Schmitt (1990) developed 25 items associated with 4 options to understand middle and upper elementary students' knowledge of strategic reading processes for narrative text comprehension. However, as stated by Schmitt (1990; 2005), Metacomprehension strategy index (MSI) can be easily adapted for expository test comprehension.

MSI aims to identify students' specific reading behaviors that occur before, during, and after reading. It measures students' awareness of predicting and verifying, previewing, purpose setting, self-questioning, activating prior knowledge, and summarizing and applying fix-up strategies. While there is no correct answer for the questions, they are correlated with specific metacognitive strategies that allow students plan, monitor and regulate, and evaluate reading. Predicting and verifying promotes active comprehension by giving the reader a purpose while evaluating predictions and generating new ones aligns with the constructive nature of reading. Previewing facilitates comprehension by providing necessary information for predictions. Similarly, activating background knowledge helps readers make inferences and generate predictions. Purpose setting, therefore, has a reciprocal relationship with predicting and previewing as readers set their purposes based on their predictions and available facilitative information for the upcoming reading. Purpose setting promotes the selection of strategies and allocation of resources. In addition to these, self-questioning promotes active comprehension for and with a purpose (Schmitt, 2005) and it helps with constant comprehension monitoring. Finally, summarizing the content at various points helps comprehension monitoring while applying fix-up strategies when comprehension fails (Schmitt, 2005).

Schmitt (1990) provided sufficient evidence for the measurement instrument's reliability and validity. This inventory can be used to identify the strategies that students are familiar with in addition to the differences among and incompetence in before, during, and after reading strategies. However, still simply interpreting individual items can be unreliable (Schmitt, 1990). This is because while a student, for example, may answer "previewing" questions with strategic response and fail to answer "purpose setting" items. This does not mean that he or she is not capable of setting goals but mastered previewing. Item numbers on this measure are limited to make such sweeping statements while strategies are related and can be scaffolding one another.

Metacognitive Reading Awareness Inventory. Developed by Miholic (1994), the Metacognitive Reading Awareness Inventory (MRAI) intends to "make students think about what they do while reading" (p.84) and to provide them with a more concrete idea of important strategies. Because awareness solely does not initiate assimilation and application of the strategies, Miholic (1994) aimed to invite students to become aware of the knowledge needed for strategy use and provide "an avenue for modelling" (p.84).

Assessing metacognitive strategies; planning, monitoring and regulating, and evaluating, the MRAI more specifically helps identify one's difficulties with understanding unfamiliar words, comprehension building, recalling important information, using personal resources and time effectively, and knowing about strategies and himself as a reader. The inventory, in total, has 10 questions; each is associated with 4 options. The MRAI is intended for students from junior high through collage. Although this inventory was developed by drawing on Paris and Jacobs's (1984, 1987) work, it is important to recognize that this inventory was not validated or tested. There is

information provided for its reliability and validity and there is no scoring rubric. However, elaborated cognitive and metacognitive strategies can benefit classroom instruction.

Metacomprehension Scale. Moore, Zabrucky, and Commander (1997) created a scale that covers seven components of reading comprehension abilities and strategies. These include regulation (methods to resolve comprehension failures), strategy (techniques to improve comprehension), task (knowledge of comprehension processes), capacity (self-perception of comprehension abilities), anxiety (stress related to comprehension abilities), achievement (importance of good comprehension skills), and locus (control of reading skills).

Metacomprehension scale (MCS) was designed for adults. MCS consists of 22 items and participants indicated their agreement on a 5 point Likert-scale. The authors suggested that MCS is a valid and reliable measure of metacognition about comprehension following the analysis of reliability and validity (factorial validity of the questionnaire, convergent and discriminant validity of the subscales, and criterion-related validity of the MCS).

Strategic Processing Analysis. Schmitt (2001) also investigated individuals' strategic reading behaviors, as "no one can see what is taking place 'inside the head' where strategies are initiated and carried out" (Schmitt, 2005, p.106). Because of this reason, she made use of running records to make hypotheses about children's awareness of problem solving strategies and then to analyze their strategic reading processing.

Strategic processing analysis (SPA) examined specifically metacognitive monitoring and regulation by the strategies including "searching for information using

various cue sources, self-monitoring, self-correcting, rereading for problem solving and conforming, and appealing for help" (Schmitt, 2005, p.107). Searching for information can be recognized when a child makes a meaningful substitution for a word. For example, decoding a word from letter to sound is an evidence for searching information by using visual sources. The evidence for self-monitoring comes from child's realization that something is wrong. It may involve attempts such as repeating a word, self-correcting, trying another word, and appealing for help. Therefore, if the child is aware of a mistake or problem, he or she can be hypothesized doing self-monitoring. Cross-checking pertains to an individual's cross-checking different sources of information against each other to self-monitor and solve problems. Children's self-correction and repeating a word or phrase after a wrong response can be examples for cross-checking. It is generally assumed that when individuals crosscheck, they realize something is wrong and they try to resolve it by checking the source against another one that they used previously. Rereading generally confirms that what an individual reads made sense following self-correction or teacher's assistance. Similarly, rereading involves children's repetition of a word, phrase, sentence or a page to solve a problem. It is thought as an evidence for self-monitoring and regulation. Lastly, appealing to the teacher's help is considered as an evidence for child's awareness of that he or she does not know a word or understand a part. Schmitt (2001, 2005) claims that "when the chart is completed, it is possible to analyze the hypotheses about strategy use and to interpret the control a child has on strategic processing" (2005, p.111).

Metacognitive Awareness of Reading Strategies Inventory. Metacognitive awareness of reading strategies inventory (MARSI) is a 5-point Likert-scale designed by

Mokhtari and Reichard (2002). It is a self-report measurement instrument assessing the frequency of reading behavior and designed for students from 6th to 12th grade. MARSI measures readers' metacognitive awareness and perceived use of reading strategies via 30 statements. It can be used to understand what students think about reading intentions and reading processes occur when students read academic or school-related materials. Like Miholic's (1994) Reading Strategies Awareness inventory, MARSI also assesses awareness. However, MARSI more specifically focuses on metacognitive-oriented strategies that are utilized during reading. MARSI is based on an understanding that in accordance with the type of the reading material, strategies change as "constructing meaning from text is an intentional, deliberate, and purposeful act" (Mokhtari & Reichard, 2002, p.251).

Conducting a series of validation procedures, Mokhtari and Reichard's (2002) factor analysis yielded three categories; global, problem-solving, and support strategies. Global reading strategies "represented a set of reading strategies oriented toward a global analysis of text" (p.252). These strategies can be considered as generalized and intentional strategies to set the stage for reading. They include:

> setting purpose for reading, activating prior knowledge, checking whether text content fits purpose, predicting what text is about, confirming predictions, previewing text for content, skimming to note text characteristics, making decision in relation to what to read closely, using context clues, using test structure, and using other textual features to enhance reading comprehension (Mokhtari & Reichard, 2002, p.259).

Problem-solving strategies, on the other hand, help readers regulate action plans when the text becomes difficult to read; therefore, they can navigate through it skillfully. Unlike global reading strategies, problem solving strategies are localized and focus on repair strategies such as visualizing reading, reading slowly, reading out loud, adjusting

reading rate, paying attention to reading, reflecting on reading, rereading for better understanding, and checking one's understanding for conflicting information.

Lastly, support reading strategies include practically functional strategies that help readers monitor comprehension. They include using outside reference material, taking notes, underlining text, summarizing, paraphrasing text information, revisiting previously read parts, self-questioning, and discussing reading with others. Mokhtari and Reichard (2002) emphasized the reciprocal relation among these three sets of strategies although they are described separately for clarity.

MARSI demonstrated reliable results and evidence for its validity. However, MARSI does not assess students' online comprehension-monitoring, but the awareness of metacognitive ability. Its results, therefore, can inform instruction by students' reading awareness and the types and numbers of reading strategies used by students.

Metacognitive Processes Inventory. Block (as cited in Bauserman, 2005) identified metacognitive processes that readers use. These include the following; semantic processes (word meanings are understood or deduced from the context), syntactic processes (grammatical structure of the text is understood), fusion of semantic and syntactic features (readers use meaning and grammar to identify and compare author's viewpoints), internal and external consistencies (readers determine whether author's ideas are logical and the text is consistent and they reflect on the facts in the text whether they match with life experiences), propositional and structural cohesiveness (readers can understand each paragraph's proposition and its consistency with the whole text while they can identify author's writing style and theme), informational processes (main idea is identified), character's personality development (for narrative text, readers

can analyze and predict the thoughts and actions of the characters), personal reflections (readers make personal connections to the text as they read), and metacognitive coherence (reader tie life experiences with the text information).

The Metacognitive Processes Inventory (MPI) gathers information from students immediately after they complete a reading act. For this purpose, metacognitive-centered questions are used. These questions reflect four domains of metacognition: regulation (monitoring and redirecting efforts), knowledge of strategy application, awareness to plan for the cognitive act, and self-assessment of one's metacognition. The metacognitive-centered questions on the MPI require sophisticated thinking and reasoning: students need to answer for example, "Explain why you think this story could (or could not) really happen. Can you describe what you were thinking when you read that passage?" (Bauserman, 2005, p. 170). These questions have no correct responses, but aim to assess students' metacognitive processing of the text.

Summary of metacognition assessment surveys and inventories. A review of metacognition measurement instruments in the domain of reading helped specify the focus of a PMR by validating the characteristics and capabilities of metacognitive readers depicted in the preceding section. As seen in Appendix D, extant metacognition surveys and inventories measure individuals' metacognitive knowledge (about strategies, self-as a reader-, text, and task) and metacognitive strategies (planning, monitoring and regulating, and evaluating). Therefore, a PMR will be developed to empower students' metacognitive knowledge and strategies.

In Appendix D, there is a separate column created for cognitive strategies that can be employed to manifest metacognitive strategies. Scanning this list, some might argue

that the list includes metacognitive strategies. Unless these cognitive strategies are chosen thoughtfully and utilized purposefully, they might not be metacognitive in nature. For example, a child can come up with some comprehension questions following reading just because the teacher has him write some questions. His ability to write some questions, for example text explicit wh- or yes/no questions, does not necessarily mean that he has knowledge about generating questions and he purposefully uses this strategy to evaluate his comprehension. Unless he knows when and how to generate questions, unless he understands the benefits of using this strategy, and unless he evaluates his comprehension by these questions and take initiatives to modify meaning making, question-generating is bound to the cognitive (object) level. Although such practices of cognitive strategy use may lead to improved metacognitive competencies for some, employing cognitive strategies may not always necessarily initiate metacognitive behavior including planning, monitoring and regulation, and evaluating. The slight distinction between these two strategy-sets can relate reasoning.

As seen in Appendix D, reasoning is adopted as a distinctive skill for its fundamental role in metacognition. Indeed, without reasoning individuals may not engage in sophisticated thinking about their cognitive enactments. They might not think about how their decisions impact reading performance and they might not recognize why they make certain decisions. Thinking about the text and relating it to goals, task demands, strategies, personal characteristics, motives, abilities, text structure, and if possible, feedback gained from self-questioning, readers can both enact control over reading and monitor the impacts of thoughtful control over reading. In other words, reasoning can

scaffold and cement two prominent processes of monitoring and control circulating between object-level and meta-level cognition that Nelson (1996) explained.

Following the review of characteristics and capabilities of metacognitive readers, it is important to review literature on metacognition instruction to develop and foster metacognition adequacy in readers.

Metacognition Instruction

Research reports distinctive characteristics and capabilities of metacognitive readers. However, as Van Keer and Vanderlinde (2010) and Veenman,Van Hout-Wolters, and Afflerbach (2006) argued, individuals can show considerable variation in metacognitive adequacy. This is because some individuals might grow up with many opportunities for acquiring metacognition under favorable conditions. They can "pick up metacognitive knowledge and skills to a certain extent from their parents, their peers, and especially their teachers" (Veenman et al., 2006, p. 9). Some others, on the other hand, can successfully develop metacognitive knowledge and strategies on their own even if there is a lack of competent models or the conditions are not advantageous. Such individuals can show sufficient competency with metacognition. However, there might be some individuals who have relevant competency with metacognition but suffer from production deficiency. As Veenman, Kerseboom, and Imthorn (2000) stated, individuals with production deficiency may not use their metacognition for several reasons including "task difficulty, test anxiety, lack of motivation, or their inability to see the appropriateness of metacognition in a particular situation" (Veenman et al., 2006, p. 10).

Moreover, there is still another group of individuals who do not or cannot spontaneously acquire a metacognitive repertoire. For them, there might not be, for

example enough social learning opportunities or experiences (Zimmerman, 2000) to acquire metacognitive knowledge and strategies, or simply these individuals might not see the relevance of learning and establishing such a repertoire of metacognition (Veenman et al., 2006). These individuals, in contrast to those with production deficiencies, suffer from availability deficiencies. They do not have sufficient metacognitive knowledge and strategies at their disposal. Metacognitive instruction, fortunately, can help ameliorate limited or no metacognitive adequacy (Anastasiou & Griva, 2009; Van Keer & Vanderlinde, 2010; Veenman et al., 2006). For this purpose, in the following, literature on metacognition instruction will be reviewed to determine *how* to develop and foster students' metacognition. To identify the nature of effective metacognition instruction, the following section will cover (a) meditations on metacognition instruction and (b) empirical approaches to metacognition instruction including recent research studies on metacognition training. Finally, (c) supplementary instructional techniques improving metacognition will also be reviewed.

Meditations on metacognition instruction. In this section, meta-teaching, dialogic talks, language of thinking, teachers' modeling and students' practicing thinking and strategic reading, cooperative learning, and situated learning will be presented as potential features of metacognition instruction.

Meta-teaching and dialogic talks. Although metacognitive development and adequacy can vary across individuals (Fisher, 1998; Van Keer & Vanderlinde, 2010; Veenman et al., 2006), Fisher (1998) still identified four general metacognitive processes. These include;

- recognizing the problem, identifying and defining the elements of a given situation;

- representing the problem, making a mental map of the problem, comparing it with others;
- planning how to proceed, deciding steps, resources and setting targets;
- evaluating progress and solutions, knowing about what you know (p.8).

To develop these adequacies in others, Fisher (1998) recommended *meta-teaching.* Meta-teaching pertains to mediating one's "metacognition to help the child make explicit their thinking and learning for the purpose of self appraisal and self management" (Fisher, 1998, p.9). To exercise meta-teaching in classrooms, dialogic teaching can be adopted. Respectively, *dialogic teaching* pertains to the verbal interactions that provide individuals with cognitive stimulus, expand their consciousness, and enlarge the dialogic space for students' thinking (Fisher, 2007).

Similar to Vygotskynian perspective proposing that all higher mental functions originate as actual relations between individuals (Van Keer & Vanderlinde, 2010), Fisher (2007) emphasized that "we develop consciousness, learn control over internal mental processes and develop tool[s] for thinking" (p.616) through dialogue. Therefore, instructional forms and learning conversations stimulating thinking can be described as "dialogic" and dialogic teaching basically appreciates the role of talk in learning environments.

Rather than its initial connotation with social or affective functions, dialogic talks focus on cognition. As Fisher (2007) pointed out, by bringing learning process to a conscious level, teachers can help students become more aware of their thoughts and gain control over learning (Fisher, 2007). For this purpose, Fisher (2007) highlighted the importance of self-questioning, including Socratic questions (a series questions progressively leading students to higher levels of thinking). Encouraging students to think about themselves and their capabilities, teachers for example, can prompt or help students

ask; “What do I think about myself? What do I know about myself? What makes me different from other people?” (Fisher, 2007, p.629), “What do I think about this text (or a particular stimulus)? Why do I think so? How do I know what I know?” Therefore, students can discover what kind of thinking they did, how they did their thinking, and how they evaluate it (Fisher,1998).

To mediate children’s cognition and metacognitive awareness, Fisher (2007) also emphasized developing or empowering students’ habits of intelligent behaviors. Fisher (2007) listed these behaviors as being curious (asking deep and interesting questions), collaborative (engaging in thoughtful discussion), critical (giving reasons and evidence), creative (generating and building on ideas), and caring (developing an awareness of self and care of others). The nature of these intelligent behaviors, in fact, invites shared responsibility with peers and in groups during discussions. As Fisher (2007) stated, while many voices create multiple viewpoints, students “acquire the capacity to narrate, explain, instruct, ask different kinds of questions, listen to and build upon answers, analyze and solve problems, speculate and imagine, discuss, argue, reason, negotiate, explore, and evaluate ideas” (Fisher, 2007, p. 618). These capabilities develop by and with language as will be discussed in the following.

Language of thinking. Language is not only a tool that one can make thinking public, but it is also a platform where thoughts wake and live through. For clarity, it is important to remember what thinking is. Back in the early ages, Socrates described *thinking* as

> a discourse the mind carries on with itself about any subject it is considering….I have a notion that, when the mind is thinking, it is simply talking to itself, asking questions and answering them, and saying yes or no....but silently oneself. It

> seems, then, that when a person thinks of one thing as another, he is affirming to himself (Plato, 1961, p.895-896).

In relation to this definition, language of thinking can be defined as a tool to "describe our own and others' mental states and mental processes" (Tishman & Perkins, 1997, p. 369). Tishman and Perkins (1997) specified language of thinking in three categories: epistemic stance, intellectual process, and intellectual product languages.

Epistemic stance language items reflect a stance or attitude towards knowledge. This group includes terms like "*conjecture, conclude, believe, confirm, doubt, know, suggest, speculate,* and *theorize*" (Tishman & Perkins, 1997, p.369). By characterizing the relationship between the thought and fact, epistemic stance terms provide essential information about how the claim was taken. For example, as the intellectual processes are different, the stance taken towards the truth is different in these two sentences; "I know reading is an essential skill of empathetic individuals" and "I conclude reading is an essential skill of empathetic individuals."

Intellectual process terms pertain to the process of thinking. They help communicate the flow and structure of thinking (Tishman & Perkins, 1997). This set of terms includes "*analyze, contemplate, discern, interpret, investigate, ponder, examine,* and *recollect*" (p.369) and they discriminate the ways of thinking. As in the case of epistemic stance, the meaning in the following two sentences is not the same, even if the difference is subtle. "I examine reading is an essential skill of empathetic individuals" and "I interpret reading is an essential skill of empathetic individuals."

Intellectual product terms are nouns that name the ideas and they play a crucial role for thinking process (Tishman & Perkins, 1997). *[C]onclusion, hypothesis, option, solution, reason, claim,* and *theory*" (p.369) are some of the intellectual product terms.

The previous proposition; “I concluded that reading is an essential skill of empathetic individuals” reflects how an intellectual process leads to epistemic stance and ends up with an intellectual product. The language itself implies an intellectual engagement and processing information to reason so. Reciprocal interaction between intellectual processes and epistemic stances can help produce intellectual products.

As Fisher (1998, 2007) highlighted, Tishman and Perkins (1997) similarly emphasized the importance of students’ communicating their mental states and processes in all sorts. Tishman and Perkins (1997) stated that individuals use language of thinking when they use reasoning, develop an idea, solve a problem, hold or reject a belief and when they can explain these internal-mental processes or lines of thought to another agent. For this reason, rather than the nuanced differences among the terms and categories of language of thinking, functions of language of thinking needs appreciation.

As emphasized in Vygotsky's (1978) social constructivist theory, students interact with their environments and they internalize the language of social groups in their environments. By the social language, students adopt the habits and tools of thinking of the social groups. Teachers’ use of and lead-in to language of thinking in classrooms can help students develop sensitivity to engage in target behaviors such as probing an assumption, looking for evidence, identifying reasons, or finding out solutions (Tishman & Perkins, 1997). In order to illustrate the phenomenon better, a classroom example by Tishman and Perkins (1997) is provided in the following.

In a fifth-grade classroom, students are discussing the disappearance of Amelia Earhart. The teacher asks her class:

> ‘What do you think happened?’ One student guesses: ‘Maybe she wanted to disappear because she didn’t like so much publicity.’ ‘That’s an interesting idea,’

> the teacher responds, then asks another student for her opinion, and then a third student for his. (Tishman & Perkins, 1997, p.371).

On the other hand, the same teacher might have verbalized the same initial question as "There are several theories about what happened to Amelia Earhart. Do you have a theory?" (p.371). As in the first instance, when the student proposes avoidance from publicity, the teacher who uses a language of thinking could have asked; "Why do you think so?" "What are your reasons?" "What evidence can support your view?" to initiate students' thinking and reasoning better. When the student gives some evidence like "… no one ever found a trace of her or her plane. That is pretty unusual, in plane crashes[,]" the teacher may even further trigger his reasoning by the language of thinking and can ask "Are you sure that's supporting evidence?" (Tishman & Perkins, 1997. p.371). As can be seen in the latter case, student-teacher dialogues can be utilized to monitor students' evolving understandings, make their thinking and reasoning explicit, and help students gain metacognitive control gradually (Duffy, 2002; Duffy et al., 1988).

Moreover, just like language which forces and shapes dispositions, language of thinking can shape thinking dispositions or tendencies towards intellectual behaviors including being reflective, intellectually strategic, and seeking reasons. That is, individuals who hear and observe language of thinking can be stimulated to enact thinking-dispositional behavior. When individuals for example, are exposed to the language of planning and strategizing, they can show indicators of goal-setting. Similarly language of self-reflection can ignite introspection in some individuals (Tishman & Perkins, 1997). On the contrary, when teachers decide for example, what kind of prior knowledge needs to be activated and ask related questions, when teachers decide what meaning needs to be monitored and ask questions focusing on it, and when teachers

decide what needs to be summarized and ask students to clarify certain points; students' metacognition is unlikely to develop. This is because teacher directs thinking and reasoning rather than students. With small nuances in teachers' wording distinctive switches in students' mental processing can be created and for this task, language of thinking can provide "the words and concepts with which though evaluates and regulates itself" (Tishman & Perkins, 1997, p.371).

Infusing language of thinking and dialogic talks into classroom lessons is important; however, exposure to such higher-order thinking does not necessarily guarantee that all students can understand its functions for performance and exercise it easily. For this reason, Fisher (1998) suggested teachers' modeling vocabulary of thought processes. However, modeling vocabulary of thought processes, in fact, requires modelling the thought processes, itself. As Fisher (1998), Schraw (2001), and Collins, Brown, & Holum (1991) suggested, instructional practices that make thinking visible and practicable are to be adopted.

Teachers' modeling thinking, language of thinking, and strategic reading. Teacher's modeling is a necessary precursor for students' development of metacognition and strategic reading. For this reason, as Duffy and his colleagues (1988) pointed out, initially mental modeling and modeling of procedures -telling students steps to complete a specific task- needs to be distinguished from each other to minimize instructional ambiguity, students' misinterpretation, and guesswork in learning strategic reading.

Teachers' mental modeling vs. modeling procedures. Emphasizing the importance of modeling for students' strategic reading development, Duffy and his colleagues (1988) stated that *mental modeling pertains to making one's reasoning visible* and unlike

modeling of procedures, mental processes cannot be reduced to finite steps. In every situation, expert readers adapt and process information differently. However, most poor readers are not so often aware of this; they are not competent and flexible with their thinking unless they are provided with mental modeling. For this reason, teachers are recommended to provide students with examples or create situations that necessitate students' reasoning and flexibility of thinking.

To exemplify teacher's efficient mental modeling, two classrooms scenarios are provided as in the following. With the text on her desk, the teacher speaks out "I'm going to read the title first. The title is *A body can tell stories, too*. Ok, now I'll look at the pictures. There are people waving their hands in the air. Hmm, they have clothes, like mediaeval age gowns and tunics, and there is a piece of writing saying *Beowulf*.… I predict this text is about lyric dance. Ok now I can read it." In this scenario, it is only the teacher who knows why and how she is doing what she is doing. Because the teacher does not explain why she is reading the title or looking at the pictures and how she predicts the text is about dance and even about lyric dance, some students cannot understand she is activating and utilizing her prior knowledge to help her read the text strategically.

The following scenario, however, can provide students with more information about teacher's reasoning and help students gain metacognitive knowledge about activating and utilizing prior knowledge. With the text on her desk, the same teacher speaks out; "Ok, now watch me think aloud and follow me while I activate and use my prior knowledge. I look at the title, it says *A body can tell stories, too.* Thinking how a body can tell stories, I am browsing the pictures. Look, there is a group of people waving

their hands in the air. Is it really waving? Uhm, I think so…Well, I also want to check their clothes…Hmm, I do not think they are modern. Well, they might be mediaeval, looking at the style, the tunics and gowns. I saw such dressing in my history and literature books before. Ok, now I am thinking about how the title and pictures can relate. How can a body tell stories? Why do these people wave their hands? Why are they wearing these clothes? Ok, let me see what else there is to help me… Here is another hint, a calligraphic piece saying *Beowulf* on it. Well, I assume the text is about lyric dance. How can a body tell a story about *Beowulf*, if it is not lyric dance? I have seen it on TV; some people do lyric dance instead of acting out the play. I am going to guess this text is going be about a dance performance about Beowulf, the epic poem written in late 10th century." In this scenario, teacher's explanations of why she is thinking certain things and how she is predicting what she is going to read is clearer for the students. In this case, the teacher models her thinking about the text and reasoning about the topic better; students can better understand how and why the teacher is using pictures and title to activate and use her prior knowledge to read better.

Mental modeling can help students develop an understanding of how to think like an expert reader. However, as students come to instructional environments with their ideas and experiences, "there is no guarantee that students' restructured understandings will be precisely the understanding the teacher intends" (Duffy et al., 1988, p.766). For this reason, Duffy (2002) and Schraw (2001) emphasized the necessity of explicit teaching of metacognition before modeling thinking about the text.

Explicit teaching of metacognition. In addition to dialogic talks, language of thinking, and mental modeling, promoting students' metacognitive knowledge is

important. For this reason, as Schraw (2001), Veenman (2013b, 2016), and Veenman et al. (2006) stated, students need to be informed about the importance and utility of strategies. To improve students' knowledge about cognition, *the WWW&H rule* (Veenman et al., 2006, p.9 empahsis in orgininal) can be adopted. That is, students are explicitly informed about "what reading strategies are, and how they facilitate reading, and when and why they should be applied" (Paris & Flukes, 2005, p.122). Visualizing *the WWW&H rule* for students, a strategy matrix fosters declarative, procedural, and conditional knowledge about each strategy. For example, on a typical strategy matrix entailing various reading strategies, prior knowledge activation *(what)* can be explained as a strategy that can be used prior to reading or for an unfamiliar task *(when)* to make new information easier to learn and remember *(why)* by pausing and thinking about what one already knows and does not know *(how to use).*

In addition to communicating the importance of metacognition and helping students improve their declarative, procedural, and conditional knowledge about strategies, as Schraw (2001) stated, it is important for students to "understand the distinction between cognition and metacognition" (p. 8). As can be seen in Appendix E, cognitive and metacognitive strategies stimulate each other. For this reason, to portray the reciprocal relation between these two sets of strategies, Zimmerman's domain general self-regulatory cycle and Veenman's action plan of text studying will be reviewed shortly in the following.

Reciprocity between cognition and metacognition. Zimmerman's (2000, 2002, 2008) self-regulatory cycle is a "prescriptive model of adequate self-regulatory behavior" (Veenman, 2013b, p.307) and it proposes that individuals are to prepare themselves

before they engage in executing tasks. For this purpose, *in the forethought phase*, individuals need to analyze the task, set goals, and plan their strategic approaches to the task demands. These activities are preparatory to the actual task performance and set standards for evaluation and reflection in the self-reflection phase. In *the performance phase*, individuals, in fact, self-control and self-observe. Self-control pertains to self-instruction, imagery, attention focusing, and employing task strategies. On the other hand, self-observation pertains to one's monitoring specific aspects of his performance, conditions surrounding the performance, and performance-effects. For self-observation, accuracy, informative nature, and timeliness of self-feedback is critical. In the final stage -*self-reflection phase*-, individuals evaluate their performances against a goal or some standard and attribute causal significance to the consequences (Zimmerman, 2000, 2002). As Zimmerman's (2000, 2008) self-regulatory model is cyclical, self-reflection may lead to renewed orientations in pervious phases. When one fails for example, in comprehension building, instead of getting stuck there by using self-generated-feedback, he can find a way to deal with the problem; he may either adjust his goals or strategies for the goal-attainment.

In addition to Zimmerman's (2002, 2008) generic self-regulatory cycle of forethought, performance, and self-reflection, it is important to operationalize reciprocal relation between cognition and metacognition in reading. Based on Zimmerman's (2000, 2002, 2008) and Pressley and Afflerbach's (1995) analysis of constructive reading processes, Veenman (2013b) composed an action plan for text studying. Veenman's action plan is composed of 14 steps. In his model, Veenman (2013b) postulated forethought phase activities as*; readers' planning* text studying by setting reading goal,

analyzing task demands, reading the title and scanning paragraph headings, finding out the main topic in the text and activating prior knowledge, making predictions, and setting out a plan how to read the text as.

For the performance stage, Veenman (2013b) recommended that readers carry out a pre-determined plan while *monitoring and regulating* it for comprehension. For this purpose, they can use resources like a dictionary and cognitive strategies like inferencing unknown words from the context, rereading to understand, checking meaning to reading plan, paraphrasing main ideas, and looking for consistencies/ inconsistencies between the ideas.

Finally, Veenman (2013b) recommended *evaluation* strategies to be employed in self-reflection phase. These include integrating main ideas into a cohesive summary, evaluating the summary by self-questioning, checking the attainment of reading goals, and evaluating oneself for extant reading weaknesses and strengths.

This action plan or any other regulatory checklists of metacognitive strategies (i.e. see Schraw, 2001), however, may not be as helpful as expected. That is, "[s]imply presenting a flowchart on the classroom wall or providing a stack of cards depicting the metacognitive action plan will not suffice for learners" unless their metacognitive experiences are scaffolded (Veenman, 2013b). For this reason, in the following section, potential instruction that lets students practice strategic reading will be depicted.

Students' practices of thinking, language of thinking, and strategic reading. Teachers' explicit teaching of metacognition and modeling thinking, language of thinking, and strategic reading is indispensable for students. However, explicit teaching and modeling on itself might not be sufficient for students' adequate and capable

metacognition. That is, for students to internalize metacognitive control over reading, they need to practice thinking about the text. Instructional practices such as dialogic teaching, cognitive apprenticeship, and Donndelinger's (2005) instructional strategy that releases responsibility of thinking and control over reading to students gradually can be adopted for this purpose.

Dialogic teaching. Dialogic teaching can be used especially for students' practicing thinking and reasoning. Typically, dialogic lessons are taught in six stages (Fisher, 2007). Such a lesson starts with *focusing exercises* during which students are informed about learning objectives, reminded discussion rules, and engaged in a relaxation or thinking game for alert and relaxed attention. During the next stage, students are presented with a *stimulus to initiate thinking*. The stimulus may be a story, poem, a reading text, or a picture. With this regard, Fisher (1998) recommended tasks be difficult, novel, or puzzling so that they can provide students with some cognitive and metacognitive challenge to think about. To resolve the disequilibrium, students can self-question what and how they think by for example, Socratic questioning. Following the presentation of the stimulus, students are given *thinking time* during which they share their thinking and ideas about the stimulus with a partner. Next, during *questioning* time, students discuss, clarify, and group different questions that arouse during pair-work as a whole class. During *discussion* stage, students are asked to respond, build on one another's ideas while the teacher probes for reasons, examples, and alternative viewpoints. Finally, during the *plenary* stage, students summarize what has been discussed, review the discussion by different means such as graphic-maps, and reflect on their learning. As dialogic teaching fundamentally highlights questioning, analyzing,

reflecting, discussing, and reasoning about cognition on one-self, with peers, and in groups, it is important to recognize its instrumental role on the development of thinking and language for thinking. In addition to practicing thinking through dialogic teaching, students had better practice thinking for reading. For this, cognitive apprenticeship model and Donndelinger's (2005) instructional strategy can be utilized.

Cognitive apprenticeship. Cognitive apprenticeship is an instructional model where one "needs to deliberately bring the thinking to the surface, to make it visible…The teacher's thinking must be visible to the students and the student's thinking must be made visible to the teacher." (Collins et al., 1991, p.3). Bringing both thinking and reading strategies of an expert into public, cognitive apprenticeship provides students with opportunities to observe, practice, and enact similar expert-abilities in situated contexts.

To develop students' strategic reading behaviors, Collins and her colleagues (1991) advocated six teaching methods: modeling, coaching, scaffolding, articulation, reflection, and exploration. These methods can shortly be described as in the following; *modeling* is a clear and detailed physical demonstration of showing novice readers how to do something that they do not know (Duffy et al., 1988). Modeling pertains to externalizing all mental activities of an expert reader by thinking and reading aloud; therefore, students can observe and build a conceptual model of thinking during reading. *Coaching* pertains to observing students while they are reading. By offering hints, scaffolding, feedback, modelling and novel tasks, teachers help bring students' reading performances closer to experts. The content of coaching interaction is directly related to specific instances or difficulties that arise while students are reading to accomplish task

demands and personal goals. *Scaffolding* pertains to the support that teachers provide so that students can achieve task demands. During scaffolding, it is important to remember that the teacher is involved in executing some of task demands because students cannot manage them on their own. As students' efficiency with reading and successful task completion increases, teachers fade their scaffolding.

Articulation pertains to students' communicating "their knowledge, reasoning, or problem-solving process" (Collins et al., 1991, p.14). By questioning, teachers can help students formulate explicit models of strategic reading experiences. *Reflection* involves students' comparison their own strategic reading experiences to an experts', another student's, and eventually to an internal model of expertise. Lastly, *exploration* pertains to students' independent strategic reading experiences. Exploration not only requires students to accomplish task demands on their own, but also to analyze task demands and formulate effective plans to manage them on their own.

Similarly, inspired by Pressley and Afflerbach's work (1995), Donndelinger (2005) recognized the essence of constructively responsive reading and proposed an instructional strategy that combines cognitive and metacognitive strategies. Donndelinger (2005) focused on prior knowledge, reflection, (organizational) overview, monitoring, inquiry, sensitivity, and evaluation and he associated them with an acronym: PROMISE.

PROMISE. To reassure that PROMISE constitutes facets of metacognitive reading, Donndelinger (2005) reviewed Pressley and Afflerbach's (1995) work and stated that "[p]rior knowledge is the foundation of metacognitive reading" (p.244). By prior knowledge, a reader can maintain constant reference back to other regulatory strategies. Overviewing helps readers to verify their purpose and predictions so that they

can continue purposeful meaning making. On the other hand, reflection is a retrospective counterpart of comprehension building and it helps summarization and synthesis of details into main ideas. Moreover, monitoring "helps readers determine if they are ready to move on to the next stage of reading and provides possible course of action should some awareness of misunderstanding arise" (Donndelinger, 2005, p.245). Inquiry (or questioning) is a drive for and the result of overviewing, reflection, and monitoring. Sensitivity pertains to (affective) responses to the descriptions, images, language, and literary devices in the text. It can be a stepping stone to evaluation where readers judge text's elements, quality, and writer's success. As Donndelinger's (2005) proposes, the PROMISE compiles all strategies holistically instead of isolating them in discrete, rigid, and sequential steps of reading acts.

Cooperative learning environments. Considering the early arguments about the impacts of language on thinking, language of thinking, dialogic talks, student-teacher dialogues, and teachers' modeling thinking, providing opportunities for students' thinking, coaching and scaffolding students' strategic reading experiences, and students' articulation of and reflections on thinking, a cooperative learning environment needs recognition as a feature of metacognition instruction.

In relation to the argument of that a dialogic space hosts many voices and these voices can create multiple viewpoints (Fisher, 2007), in a cooperative learning environment students are encouraged to think, articulate their thinking, and question each other's thoughts, knowledge, and reasoning as Fisher (2007) postulated. Cooperative learning environments are also characterized by personal investment and mutual dependency for mastery-goals (Schraw, 2001). In such environments, while working

towards a common goal, students can develop an understanding of expertise cooperatively. In fact, like Fisher (1998, 2007), Tishman and Perkins (1997), and Collins et al. (1991), Schraw (2001) emphasized that distinctive contributions of peers to each other's metacognition development sometimes can be more effective than teachers.

Moreover, students can develop a sense of ownership and responsibility for learning in pairs or groups (Collins et al., 1991). Peer assessment of learning (PAL) groups described in the PROMISE can be a very appropriate example here. Donndelinger (2005) described PAL groups as reading circles; three members read at the similar level perform a rotating role of thinking. During PAL group readings, while one member reads and thinks aloud, another takes notes of the thoughts that the reader verbalizes, and the third individual records his own web, alone but still within the group. Therefore, a combination of three webs provides PAL groups a view of metacognitive thoughts. As students get accustomed to thinking and master strategic reading, PAL groups start to use a single web with each group members' individual contributions while they simultaneously maintain accountability for their final product.

Situated learning. As Collins and her colleagues (1991) and Duffy (2002) emphasized, instruction embracing language of thinking, explicit teaching of strategies, modeling, dialogic talks in a cooperative environment, and students' strategic reading practices are impacted by the sociology of learning. Regarding this, according to Collins et al. (1991), situated learning should be a critical characteristic of instruction. By situated learning practices, students understand the purpose of content learning, build a proper content knowledge repertoire, learn different conditions under which knowledge can be used, and transfer it to new contexts and even domains. For these reasons,

metacognition instruction needs to be situated in the context of content matter as also suggested by Veenman et al. (2006).

Summary of meditations on metacognition instruction. This literature review section of meditations on metacognition instruction helped clarify conceptualization of metacognition instruction and more specifically identify some features of instruction. Metacognition instruction pertains to meditating one's metacognition to make others' metacognition explicit. Metacognition instruction aims to help individuals bring their thought to conscious level and gain control over thinking about the text for comprehension and successful task performances.

To improve students' metacognition, teachers need to explicitly teach metacognition, do mental modeling, and initiate a dialogic space for students' questioning and reflections. However, initially it is important to have students recognize that they think and thinking pertains to cognition and metacognition. To facilitate students' knowledge about and regulation of reading, teachers can model thinking where cognitive and metacognitive strategies operate simultaneously and impact reading performances beneficially. During modeling, teachers can use language of thinking because it fundamentally helps develop students' thinking dispositions. Language of thinking not only provides students with the tools of thinking but also help with depicting, facilitating, and evaluating one's thinking. In addition, students need to understand that cognitive and metacognitive strategies are different; however, they have a close reciprocal relation. These two sets of strategies can stimulate and impact each other. To demonstrate the mutual flow between cognitive and metacognitive operations, teachers had better explain *the WWW&H rule* and show the interactive reciprocity

between cognition and metacognition by for example, self-regulatory models of reading (e.g. Veenman, 2013b). However, teachers' direct explanation of strategies, modeling thinking, and utilization of text studying models can basically raise students' metacognitive knowledge. It is important to lead students to practice strategic reading and question themselves and in relation, their thinking about the text. For this purpose, teachers had better create a dialogic space where everyone in the classroom is encouraged to make his thinking and knowledge public and challenge another's.

Metacognition instruction aims to develop students' autonomous strategic reading competencies and capabilities. For this reason, teachers need to launch gradual release of responsibility while teaching metacognition. Initially, students can benefit from guided-practices of strategic reading where they can exercise metacognition under the guidance of teacher, with the help of some instructional aids, and with peers or in groups. Graphic organizers or though-webs that regulate thinking about reading and help visualize strategies can be used to make abstract thinking more explicit and manageable. Worksheets of Socratic or metacognitive questions can also help students with awareness and challenge them to improve metacognitive knowledge.

To empower students' engagements in strategic reading, cooperative learning practices can also be adopted. By peer-tutoring or discussions in groups, students can practice analyzing task demands, identifying problems and resources, goal-setting, monitoring, resolving comprehension problems, and evaluating strategies and performances. To help with students' reasoning, reflections on thinking about reading and self-questioning of reading can be adopted. For this purpose, materials that can create cognitive disequilibrium may be used. By creating a cognitive conflict, such materials

can help students explore and compare their previous knowledge and regulate their cognition and resources to experience equilibrium. During all these guided-practice instances, teachers need to be cognizant of students' struggles to provide appropriate coaching, scaffolding, and feedback. Following these, students can be provided with independent practice opportunities for autonomous strategic reading experinces.

Reviewing meditations on metacognition instruction revealed an interesting pattern: the literature on metacognition instruction might be too optimistic. That is, although characteristics and capabilities of metacognitive individuals or metacognition instruction practices are presented, literature seems to ignore the role of teachers and spontaneity of the instruction. The reciprocal and dynamic relation between these two entities, however, can mediate students' metacognition. To exercise and manifest similar realities in classrooms, teachers' understanding of and practices for teaching metacognition needs both examination and empowerment, if necessary. This is because, although hypothetical classroom assumptions and in relation various methods, techniques, or models of metacognition instruction are available, teachers might not necessarily (be able to) practice them in their unique classrooms.

Research-based approaches to metacognition instruction. In this section, research-based metacognition instruction routines will be portrayed. To inform a pedagogy of metacognition best, literature selection criteria will be employed. This section will cover (a) experimental and quasi-experimental studies that (b) portray a detailed description of instruction helping students' metacognition development. All studies will portray (c) a transfer of metacognitive control to students (participants). All studies will also meet (d) prolonged training criteria. That is, studies which implemented

more than a single teaching unit of metacognition instruction will be included in this review. Moreover, all studies will come from (e) the field of reading in a native language, except for one study. Although this particular study (i.e. Cubukcu, 2008) pertained to reading in a foreign language, because of the scarcity of studies meeting research selection criteria and ensuring participants' proficiency in the foreign language, Cubukcu's study will be included in this review. It satisfied rest of the criteria. Furthermore, there will be (g) no restrictions with publication date and all studies will come from (g) peer-reviewed or referred publications. The following figure presents the literature selection criteria.

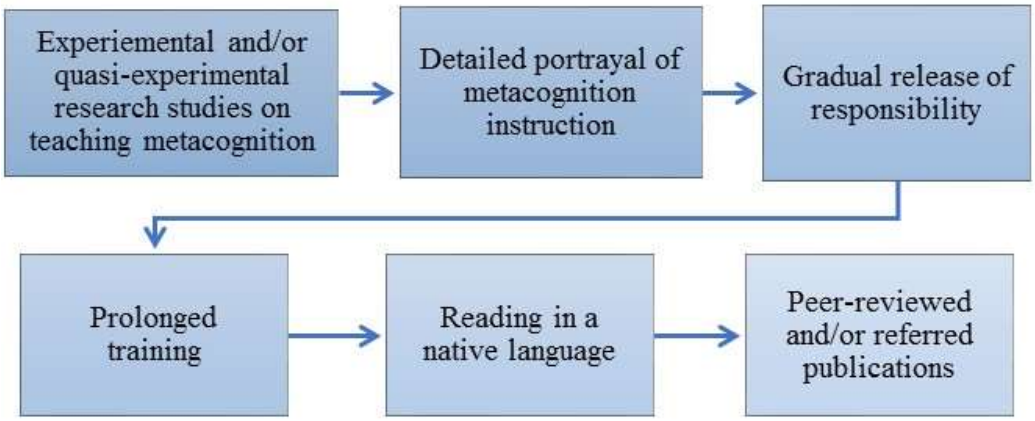

Figure 3. Criteria for selecting empirical literature on metacognition instruction

To inform a pedagogy of metacognition best, selected literature will be presented in two main subsections as in the following; (1) pioneering instructional approaches to metacognition instruction and (2) recent research studies on metacognition training. However, as Ellis, Bond, and Denton (2012) already stated, the number of empirical studies on metacognition instruction with a detailed description of classroom training is limited. Ellis, Bond, and Denton (2012) could identify 13 studies in total when they applied similar selection criteria except from the restrictions with the domain. The status-

quo of metacognition training research has not changed much since then. The spectrum of potential studies, however, got narrower with a focus on reading.

In addition to the scarcity of empirical research in this field, a lack of consistency in using the terms skill and strategy needs declaration. Considering instructional clarity and different instructional implications, it is important to remember that the distinction between skills and strategies stem from individuals' awareness, control, goal-directedness, and adaptability. For individuals to "select an intended path, the means to the goal, and the processes used to achieve the goal" (Afflerbach et al., 2008), they need an awareness to adopt strategies flexibly. Individuals can also examine the strategy, monitor its effectiveness with regards to task demands and personal efficacy, and troubleshoot by revising either goals or means to the ends, when necessary. In time, with practice individuals can gain fluency with strategies and effortful strategies can transform into skills. That is, as Paris, Lipson, and Wixson (as cited in Afflerbach & Cho, 2009) stated, strategies are "skills under consideration" (p.70).

Accomplished reading is a balance of reading skills and strategies to decode text, understand words, and achieve comprehension (Afflerbach et al., 2008). That is, readers shift between skills and strategies depending on the difficulty of the text, task, and contextual variables. When readers have strong topic knowledge and when the materials- the genre of the text and the nature of reading- and the goals are familiar and appropriate, respectively (Afflerbach & Cho, 2009); readers can usually utilize skills. However, when they encounter for example, difficult texts, "when their knowledge is sketchy," (Afflerbach et al., 2008, p.371) or when reading tasks are difficult or complex, readers use strategies.

Reviving literature and especially research studies on metacognition training, the author recognized that skills and strategies have been used inconsistently and interchangeably. In the following review, skills and strategies will be used interchangeably. This is not only because the author intends to keep researchers' autonomous terminology and original language intact, but also because there is not much evidence to differentiate these two. On the contrary to Afflerbach and his colleagues' (2008) proposal, previous research did not consistently investigate whether or how strategies transferred into skills. Rather, such studies assessed the products of metacognition instruction periods.

Instructional approaches to metacognition. Metacognition research in education has a pattern that started with the identification of characteristics and capabilities of metacognitive readers, as can be seen in Figure 1. Once these metacognitive features were identified, research started to assess them and examine whether these capabilities could be taught. For this purpose, research studies examined the effectiveness of metacognition training by mostly performance indicators, such as reading scores. Research found evidence for that everyone who is capable of a skill can develop metacognitive capability (Schraw, 2001) when they are provided with appropriate support. Therefore, to inform a PMR, research studies that embrace various forms of instruction, for example scaffolded instruction, direct instruction, cognitive coaching, and cooperative learning (Paris & Winograd, 1990) will be reviewed in the following.

Scaffolded instruction. Vygotsky (1978) stated that higher mental functions develop on two levels. That is, higher order thinking first appears as a form of cooperation or interaction among people, and then it is internalized by individuals as a

part of their competency. In relation to Vygotsky's (1978) proposition, scaffolded instruction that promotes the dialogue between the teacher and students to provide students with enough support and guidance for the goals beyond students' extant level can be used to teach metacognition (Paris & Winograd, 1990). In the following, some forms of scaffolded instruction will be reviewed to inform a pedagogy of metacognition.

Reciprocal teaching is an instructional routine that combines metacognition and scaffolded instruction. Reviewing reading education literature, Palinscar and Brown (1984) identified main functions of competent reading as understanding the explicit and implicit purposes of reading, activating relevant background knowledge, allocating attention, critical content evaluation for its consistency and compatibility with prior knowledge, monitoring comprehension, and drawing and testing inferences and conclusions. To promote students' competent reading, Palinscar and Brown (1984) focused on four strategies and instituted a procedure where students alternated roles of teacher and learner while gradually taking over the responsibility for strategic reading.

The goal of reciprocal teaching is to enable students' independence with four comprehension strategies; predicting, questioning, clarification, and summarizing (self-review). By asking students to summarize a section of the text, teachers can have students check whether they understand the text. By having students ask questions, teachers can call students' attention on main ideas and check their current state of understanding. By asking students to clarify their understandings, teachers can initiate students' critical evaluation and help them make predictions regarding the future content. These four strategies overall help students enhance comprehension as they can check whether comprehension is occurring and can regulate resources when comprehension fails.

Researchers like Gourgey (1998) and Paris and Winograd (1990) considered reciprocal teaching as a form of scaffolded instruction. This is because reciprocal teaching features interactive communication and mutual flow of information between the teacher and students through a dialogue and this dialogue focuses on strategies and text comprehension. In the early stages of reciprocal teaching, the "teacher routinely reminds students of why these strategies are important and how they will help students in their reading" (Duke & Pearson, 2008, p. 115) and models use of strategies. Gradually, students' control over strategies increases and teacher's role in leading students and modeling diminishes. To help students gain autonomy with and responsibility for strategy-use, students are encouraged and guided towards participating in and then leading small group cooperative practices of strategic reading. Eventually students become proficient enough to use the strategies with little or no support, at all (Duke & Pearson, 2008), regulate their own reading activity, and generate their own feedback (Gourgey, 1998).

Typically, a reciprocal teaching session begins with revising previous session's main points and recalling the topic or with activating background knowledge and making predictions, when the reading is new. Next, a student is assigned as "the teacher" to lead reading and the rest reads the first paragraph silently. Student-teacher then asks questions about the paragraph and summarizes it. Student-teacher also asks questions to clarify meaning if necessary and predicts what might be in the next paragraph. Whenever student-teacher needs help with thinking aloud his or her executing strategies, the classroom teacher prompts. At the end, the classroom teacher provides praise and feedback for student-teacher's work (Duke & Pearson, 2008; Palinscar & Brown, 1984).

The effectiveness of reciprocal teaching was examined by Palinscar an Brown (1984) in different studies. When children in reciprocal teaching condition were explicitly told that these strategies are to help them better understand the text and they were reminded that they should try to do something similar while reading independently. Following the treatments, the quality of students' summaries and questioning improved. Compared to control group students who were trained to locate information in the text, students in reciprocal teaching group showed significant gains in retention, better strategy maintenance over time, and generalization to classroom comprehension tests. Moreover, Rosenshine and Meister (1994) did a meta-analysis of 16 studies incorporating reciprocal teaching and they found a medium effect size of .32 regarding instruction.

Direct instruction. Metacognitive strategies become the content of the lesson when they are taught via direct instruction (Rieser et al., 2016). That is, students and the teacher discuss when, how, and why to use specific strategies and then students practice strategies, reflect on their learning, and try to improve it (Rieser et al., 2016). Duffy and his colleagues examined impacts of teacher's explanations of reading lessons and comprehension strategies in different studies.

Duffy et al. (1986) initially hypothesized that "what teachers say about the instructional content directly influences what students…think they are to learn, and…students learn more when they are consciously aware of what they are to do and when to do it" (p. 239). Unlike reciprocal teaching's narrow-scope of strategies, Duffy et al. (1986), in fact, did not view strategies as strict rules but flexible plans for reasoning. In other words, skills are to be applied thoughtfully, consciously, and adaptively so that

readers can remove blockages from constructing meaning by monitoring, controlling, and evaluating comprehension (Duffy, 2002).

For students to develop metacognitive awareness and self-controlled applications of reading strategies, teachers were trained to model a metacognitive approach to reading. For this purpose, teachers were helped design a five-step lesson (Duffy et al., 1986). This lesson format included:

> (1) an introduction of the skill to be taught (what, how, and why), (2) an explanation of the skill which includes the thinking process modeled aloud by the teacher, (3) teacher interaction with students during which (a) students are given a chance to practice the skill and to explain their thinking of the process, and (b) the teacher corrects mistakes and tries to get students to think through the use of the skills on their own, (4) practice in using the skills (e.g., on worksheets), and (5) application of the skill in connected text (e.g., books) ((Book et al., 1985, p.30-31).

Applying this format to lessons, teachers used explicit explanations more and in relation, students' metacognitive awareness of what is taught, why it is taught (both the context of the skill and the capabilities of the learners in that context), and how the task is accomplished increased (Book et al., 1985; Duffy et al., 1986). Direct explanation, in fact, "helps students decompose difficult tasks and equips them with useful tactics for problem solving. It helps identify learning goals and effective ways to reach them" (Paris & Winograd, 1990, p. 34).

Duffy's (1986, 1987, 1988) consecutive studies provided some evidence for students' increased metacognitive awareness following direct instruction of metacognition; however, reading performance scores did not reflect significant gains on behalf of experimental group students over control groups. Students who received explicit explanations about reasoning and reading strategies reported that they used such reasoning while reading and in fact, they could describe their reasoning. However, there

was no immediate performance increase on reading comprehension tests (Duffy et al., 1987). Students who got explicit training on strategies and reasoning achieved higher reading performance scores on a measure administered 5 months after the study (Duffy et al., 1987).

Considering these inconsistent findings, it is important to recognize that explicit teaching of reasoning and reading strategies may not result in immediate performance increase; "however, they do appear result in a gradual restructuring of student understanding over time" (Duffy et al., 1987, p. 364). Duff and his colleagues (1986, 1987) hypothesized that teachers' inconsistent explicit explanations might be a reason for students' not being able to do strategic reading. As the interviews conducted at the end of the Duffy et al.'s (1986) study confirmed that teachers did not consistently use explicit explanations in their routine teaching. These teachers stated that it was difficult to develop and impellent such consistent explicit explanations of strategies, to commit themselves to teaching skills as strategies, to do the proactive task analysis, to model mental processes of strategy use, and to alter instruction provided in books.

Moreover, these inconsistent findings might also highlight developmental nature of metacognition. That is, although students are explicitly taught, modeled, and given some time to practice metacognition strategies with peers or in small groups, students' expertise with strategic reading can take some time to emerge. Metacognitive knowledge might not automatically transfer into metacognitive regulation to control over reading as a byproduct. For this reason, as Veenman and his colleagues (2006) and Cubukcu (2008) stated, prolonged metacognition training needs recognition and appreciation.

Cognitive coaching. Cognitive coaching embraces components of direct and scaffolded instruction (Paris & Winograd, 1990). As Paris and colleagues (1986; 1990) emphasized, during cognitive coaching the teacher and students cooperatively strive for a common goal; students' mastery of strategies and in return, improved learning by reading. While teacher's sharing his or her knowledge enables modeling strategies and strategic reading, students' sharing their knowledge reciprocally helps with instructional regulation. By dialogues between the teacher and students, teachers can understand students' weaknesses and misconceptions. Therefore, teachers can help to satisfy students' needs and support their development towards an expertise in strategic reading.

Metaphors and analogies are important features of cognitive coaching as they provide concrete representations of mental actions during reading. Moreover, they can "help to initiate group discussions about what strategies are, how they operate, when they should be applied, and why they are useful." (Paris & Winograd, 1990, p.38). To illustrate cognitive coaching, Informed Strategies for Learning (ISL) program can be referred as an example.

ISL intends to increase "children's understanding of reading tasks, goals, and strategies by describing what, how, and why various strategies influence reading" (Jacobs & Paris, 1987, p.267). For this purpose, ISL embraces some features of direct and scaffolded instruction and benefits from concrete analogies or metaphors for cognitive skills and group discussions as the distinctive characteristics of ISL (Paris et al.,1984).

Typically, an ISL lesson starts with teacher's explicit description of strategies and utilization of analogies; for example, comprehension monitoring and traffic signs (Paris et al., 1984). For example, a red sign of stop may help students to pause to think, look up

new words; a caution sign can help them slow down; and a dead-end sing symbolizes comprehension failure and asks students re-read the section. By using such analogies, teachers can help raise students' knowledge of different reading strategies (Paris et al., 1984). These analogies, most of the time, are hanged on the classroom walls. To reinforce learning, analogy-boards include several questions directing children to think about how, why, and when to apply strategies. Following teachers' explanations, students practice strategies on worksheets. Worksheets incorporate the same analogies and questions that are used during teacher's explicit instruction and that are hanged on the walls (Paris et al., 1984).

Like Reciprocal Teaching, ISL operates by the gradual release of responsibility. Retention of strategies are reinforced by group discussions. Jacobs and Paris (1987) divided these discussions into two main categories; before- discussions and follow-up discussions. Before-discussions focus on how, when, and why to use strategies. Respectively, follow-up-discussions focus on the group feedback regarding the benefits, ease, or difficulties of selecting and using strategies to identify, construct, and monitor meaning (Paris et al., 1986). During group discussions, the teacher and students make their thinking public and share their understanding of text and levels of meaning. Participants can see how their views and reasoning are similar to and different from those of their peers. For this reason, group discussions can be used to resolve misconceptions by listening to other children and by teacher's explicit corrections (Paris et al., 1984). Incorporating explicit instruction, guided practice of strategies, and discussions, ISL aims to "to convince students about the value of using strategies independently" (Jacobs &

Paris, 1987, p.272); therefore, they can transfer these strategies to content area reading and learning.

Jacobs and Paris (1984, 1987) carried a set of consecutive studies enacting ISL and tested its effectiveness on students' self-directed and independent reading endeavors. In their latest study, Jacobs and Paris (1987) delivered strategies training in three phases. The first phase focused on awareness of reading goals, plans, and strategies; planning and preparing to read. The second phase addressed specific strategies related to comprehension; identifying meaning, reasoning about text content, and comprehension monitoring. The final phase helped children learn to evaluate and regulate their reading. In each phase, there was a distinct strategy while strategies for comprehension construction (elaboration, inference, integration, activation of prior knowledge, and summarization) and comprehension monitoring (rereading, self-questioning, checking consistencies, and paraphrasing) were emphasized throughout the school year (Jacobs & Paris, 1987). In all ISL studies, advantageous results in reading awareness, understanding of reading strategies, and goals were found following the trainings (Jacobs & Paris, 1987; Paris et al., 1984; Paris & Jacobs, 1984). In relation, all students in experimental condition performed better on reading comprehension tests (Jacobs & Paris, 1987; Paris et al., 1984).

Cooperative learning. Paris and Winograd (1990) defined cooperative learning instruction by referring to social exchange of shared knowledge. In cooperative learning settings where students work together to complete tasks, householders help each other restructure ideas and refine target skills by explaining and discussing their cognitive processes. Especially cognitive dissonance experienced during group discussions has an

important role in learning. “Disagreements among group members force individuals to seek new information or seek to understand old information from a new perspective” (Paris & Winograd, 1990, p.40).

As Paris and Winograd (1990) stated cooperative learning involves a variety of instructional practices including “modeling, direct explanation, scaffolded instruction, and group activities” (p.41). It simultaneously provides a space for students’ interpretations and perceptions of learning tasks while teachers provide information and structure learning opportunities. To clarify instructional characteristics in this realm, transactional strategies instruction (TSI) and cooperative strategic reading (CSR) will be reviewed in the following.

Pressley, Beard El-Dinary, Gaskins, Schuder, Bergman, Almasi and Brown (1992) developed transactional strategies instruction to teach students coordination of a repertoire of strategies and to encourage them to theorize about reading. For these purposes, Pressley and his colleagues (1992) benefited from psychology and reader response theory. In psychological sense, strategy instruction is transactional. This is, instructional activities are determined jointly by the teacher and students while they are interacting with the text and each other (Pressley et al., 1992). Even if teachers can begin the lesson with particular ideas, students’ needs and growth strongly influence how the lesson processes. That is “if students are ‘not getting it,’ the teacher changes tactics” (Pressley et al., 1992, p.516). Alternatively, students’ responses may cause discussions that the teacher has not planned. In literary sense, Pressley’s strategy instruction is transactional because teachers and students construct an understanding of the text jointly by interacting with each other and the text. Meaning derived from the text can be

determined by reader's background knowledge, interests, or reading purposes if students read independently. However, when students read in groups or collaboratively with the teacher, different background knowledge repertoires and purposes meet. Therefore, meaning is constructed by a small interpretive community (Pressley et al., 1992). In such small groups, students can compare and consider different views and meanings of the text before they reach a community-generated meaning (Pressley, et al., 1992).

Pressley and colleagues (1992) stated that the purpose of TSI is to help students plan and monitor reading, develop self-regulated use of strategies, and become more reflective and interpretive by cooperative works. Reading in a group is, in fact, highly strategic and advantageous. While students and the teacher read and act together; they decide and apply some strategies "to advance, modify, or reject certain interpretations" (Pressley et al., 1992, p.516). In other words, not only do they generate and negotiate many alternative perspectives for meaning construction, but also students develop an awareness and repertoire of different skills and background knowledge. As Pressley and colleagues (1992) hypothesized long-term participation in such groups can result in the "internalization of the 'executive' activities of the group" (p. 516). Similar to Vygotsky's (1978) arguments about internalization of social interactions, students can eventually adopt teacher-scaffolded or peer-scaffolded reading as their usual meaning-making and reading behavior.

TSI basically maintains four characteristics to contribute to individuals' self-regulated cognition (Pressley et al., 1992). Unlike most instructional techniques and methods which focus on certain strategies, TSI emphasizes (a) a repertoire of diverse reading strategies. By teachers' direct explanations and modeling and by guided practices

with peers or in small groups, students can adopt and use a set of strategies. Rather than directing students to follow certain steps, teachers need to inform students about the variety of possible choices they can make; strategies may change in consideration of task demands and text features. For this reason, TSI also encourages students' (b) metacognitive approaches to reading. That is, students are taught how, when, and why to use strategies to attain task demands and personal goals. Moreover, TSI emphasizes increasing (c) nonstrategic world knowledge. Because at some level, prior knowledge shapes approaches to meaning making, TSI encourages students to benefit from the knowledge they have acquired and brought to reading situations. For this reason, activating students' background knowledge and exchanging ideas should be valued while students construct meaning in small groups. Lastly, Pressley and colleagues (1992) stated that TSI integrates (d) student motivation. This characteristic pertains to the understanding that individuals determine meaning by strategies and prior knowledge. Therefore, for TSI's purpose, teachers need to emphasize that everyone in the group can understand the text with the help of strategies and by using his prior knowledge and each student's contribution in group-reading group is valued.

Several studies supported TSI is effective in improving reading comprehension (e.g. Anderson, 1992; Collins, 1991) and on students' overall self-perception as a reader (e.g. Casteel, Isom, & Jordan, 2000). By direct explanation, modeling, teacher-coaching, and peer-collaboration, students gradually assume full-responsibility for reading comprehension and metacognitive approaches to reading.

In addition to TSI, CSR can be disseminated as a form of cooperative learning. Vaughn and Klinger (Klingner, Vaughn, & Schumm, 1998; Klingner, K & Vaughn,

1998; Vaughn & Klingner, 1999; Vaughn, Klingner, & Bryant, 2001) developed CSR based on the understanding of reciprocal teaching. The purpose of CSR is to improve reading comprehension and increase conceptual learning by reading. In CSR, students learn to preview the text, monitor comprehension and use fix-up strategies, identify main idea, and summarize the text while working collaboratively (Klingner & Vaughn, 1998).

For the purpose of CSR, Klingner and Vaughn (1998, 1999) overviewed four target comprehension strategies and explained how to teach each. By previewing, students are to scan the text quickly, learn as much about the text as they can in a short period of time, to activate background knowledge, and to predict the content. In order to teach previewing, Klinger and Vaughn (1998) emphasized utilization of headings, bolded or underlined words, visuals like pictures, graphs, and tables, or any other information available so that students can brainstorm, activate prior knowledge, and generate predictions or expectations about the text-topic. For this reason, students are provided some time to generate ideas and discuss them with the partners.

For comprehension monitoring and regulation, Klingner and Vaughn (1998) developed "click and clunk." Click pertains to text's making sense to the reader; on the other hand, clunk refers to comprehension failure. "Click and clunk" is to teach students comprehension monitoring. To help students gain a habit of comprehension monitoring and controlling, Klingner and Vaughn (1998) suggested practitioners ask students whether everything is clicking and whether there is any sections clunking. In fact, awareness of comprehension failures is a prerequisite for identifying why it does not make sense and taking actions against it. For this reason, students are to be reminded various strategies. If a student cannot comprehend a certain part because of an unknown

word, he or she can be reminded for example, rereading the sentence without the word, rereading the sentences before and after the clunk for clues, or breaking the word apart and try to make sense of prefix or suffixes.

Klingner and Vaughn (1998) also emphasized empowering students to get the gist. By identifying the most important idea in a section, students are to paraphrase it very shortly as an evidence they understood what they read. While students may work alone or in pairs to find out the gist, they are supposed to back up their responses with the evidence from the text and share their responses with others. They are also invited to comment on each other's responses, discuss the best answer, and provide rationale for their arguments.

Lastly, Klingner and Vaughn (1998) emphasized students had better learn to wrap-up by generating questions and answers about the content and by reviewing the key ideas. Empowering students' summarization skill, generating wh-questions about the important information in the text can be an efficient way to wrap-up. Moreover, to stimulate students' higher-order thinking, Klingner and Vaughn (1998) suggested use of inference questions. To answer such questions, students need to think about how the text resonates with their experiences, life, and goals. To refine and reinforce higher order thinking, students need opportunities for asking inference questions and state their rationale not only for their answers but also for their questions. Moreover, Klingner and Vaughn (1998) also suggested students can pretend as if they are teachers and ask questions that would be on a test. Promoting students' self-assessment, such questions can help students differentiate important information from the details and think about their learning goals. While a student asks a test-like question, he or she can revisit the

goals and measure his or her mastery of the content against the learning standard (Klingner & Vaughn, 1998).

Similar to previous instructional routines CSR's instructional procedure also aligns with the idea of gradual release of responsibility. Initially, the teacher orchestrates instruction including explicit teaching of the strategies, modeling, role-playing, and thinking-aloud (Klingner & Vaughn, 1998). However, in CRS the teacher introduces a strategy at a time. When students acquire two of the four strategies, the teacher provides procedures to integrate them (Vaughn & Klingner, 1999). Following teacher's demonstrations, students practice strategies by teacher-guided activities. Then, students form heterogeneous proficiency groups. In these small groups, students practice strategies considering their goals and task demands. Each student in small groups is assigned particular roles and take turns to teach a strategy.

For the implementation of CSR procedures in small groups, Klingner and Vaughn (1998, 1999) identified five student-roles. The *leader* manages CSR procedure's smoothly by deciding what to read and which strategy to apply. This student asks assistance from the teacher, if necessary. The *clunk expert* reminds steps or strategies to follow when the group cannot make sense of a word, concept, or part of text. The *announcer* manages even communication within the group and calls on different members to share their ideas. The *encourager* watches the group and gives feedback. This student, as the name proposes, encourages all students to participate in group discussion and help each other. He or she praises other group members for their contributions and offers some suggestions for improved engagement. *Reporters* are the representatives of each small group. The students taking this role announce the main idea

and a question that their group agreed during the whole class discussion. Lastly, *time keeper*, which is an optional role, sets the time for CSR procedure and keeps his group members informed about the time to move on to the next steps or to finish collaborative work.

To assess the effectiveness of CSR on comprehension, Klinger and Vaughn did numerous studies. In Klingner, Vaughn, and Schumm's (1998) and Klingner, Vaughn, Arguelles, Hughes, and Leftwich's (2004) studies, 4th graders were taught collaborative strategic reading by the researchers for 11 consecutive days and by the classroom teachers for a year, respectively. In both studies, control groups received traditional instruction with the same content. Compared to the control group, experimental group students in both studies showed improvement in comprehension. In the former study, although experiment group students implemented comprehension monitoring, fix-up, and main idea strategies consistently, there was no difference in content knowledge gain between control and experimental groups (Klingner, Vaughn, & Schumm, 1998). In the following years, Vaughn, Klinger, and Byrant (2001) especially emphasized the importance of and effectiveness of well-organized peer-mediated instruction (e.g. students partners, small groups) on reading comprehension and content-area reading.

Summary of instructional approaches to metacognition. Review of previous research-based approaches to metacognition instruction confirmed that metacognition instruction research started shortly after metacognition theory was adopted by the field of education. Studies on metacognition instruction and reading performance date back to early 1980s. However, peer-reviewed empirical studies that portray a clear and detailed

description of prolonged training and that portray gradual release of metacognitive control to students, unfortunately, have not accumulated much since then.

Review of research-based approaches to metacognition instruction in reading confirmed that metacognition training can help students develop characteristics and capabilities of metacognitive readers. That is, metacognition instruction in reading fosters students' knowledge about and regulation of reading by the following strategies: planning to read, activating prior knowledge, predicting, questioning, clarification, summarizing, identifying main idea, using text features to support comprehension, comprehension monitoring and controlling, rereading, self-questioning, checking inconsistencies, adapting strategies, problem solving, paraphrasing, inferencing, relating text to life experiences, drawing conclusions, reasoning, and self-assessment. As seen, cognitive strategies are dissolved in metacognitive strategies for improved comprehension or reading performances. However, only few researchers argued the importance of raising students' self-awareness as readers.

Review of research-based approaches to metacognition instruction also helped identify instructional practices that support students' metacognition. All instructional programs, models, or techniques aligned with the gradual release of responsibility framework. Gradual release of responsibility pertains to the purposeful shifts of cognitive load from the teacher, to joint responsibility of teacher and students, and to students' independent practice and application (Fisher & Frey, 2013; Pearson & Gallagher, 1983). Metacognition instruction and gradual release of responsibility framework similarly aim to empower students' autonomy and independence with learning; therefore, researchers'

adoption of some or all features of gradual release of responsibility should not be considered as coincidence.

Gradual release of responsibility (GRR) instructional units aim for students' total responsibility for the task (Pearson & Gallagher, 1983). GGR assumes that learners need teachers' guidance in reaching the stage of independence (Pearson & Gallagher, 1983). For this purpose, GGR accommodates four phases. These include (1) focused instruction where a teacher sets goals and models the task completion or demonstrates strategy use for the complex act of reading comprehension (Fisher & Frey, 2013). GRR also implements (2) guided instruction where students work in small groups and with instructional materials e.g. questions, prompts, cues to comprehend the text and simultaneously use strategies for this purpose (Fisher & Frey, 2013). In the phase of (3) collaborative learning, students engage in negotiations, discussions, and inquiry with others to make meaning from the text and use strategies appropriately to the task demands. Finally, (4) independent task stage is where students are able to transfer information and strategies to unique situations of comprehension building and task completion (Fisher & Frey, 2013; Pearson & Gallagher, 1983). During these stages, teachers provide suggestive feedback rather than corrective feedback (Pearson & Gallagher, 1983). Because students' approaches to comprehension might change, the teacher can praise students' appropriate application and justification of strategy-use and help them think about the alternative ways of dealing with problems, if there are any at all. Regarding metacognition instruction practices adopted for research, it was concluded that although there might be slight variations, in general metacognition instruction research aligns with the GRR phases.

Metacognition instruction practices are brought together within the framework of gradual release of responsibility to inform a pedagogy of metacognition. Metacognition instruction ensures focused instruction by teacher's direct explanation of and modeling strategies through think-aloud. As communicating or creating a reading goal is important to speed on students' awareness, recognition, and internalization of the strategies, teachers informed students about the importance of strategies. Then, teachers modeled when and how to use strategies flexibly and alternatively with regards to task demands. In relation to guided instruction phase, to explain abstract strategies better and to show their impacts on comprehension and task completion, metaphors or analogies and graphic organizers were utilized. Moreover, teachers' use of prompts, clues, and questions that initiate students' thinking about the text and controlled use of strategies was captured. At this stage, students worked with peers or in small groups where peer-support, teacher-scaffolding, and feedback could be provided sufficiently. Following teacher modelling and working with peers or with graphic organizers, students were invited to explain their thinking and strategy utilization to others. Students discussed their weaknesses and strengths regarding strategy use and difficulties for task completion or comprehending. Interestingly, metacognition instruction research replaced the last phase-independent tasks- of GRR by testing students' reading performance. Instead of adapting independent task period to let students practice metacognitive behavior for a while and instead of observing, examining, and discussing students' independent manifestations of strategic reading, research used follow-up test scores as indicators of both improved metacognition adequacy and independence with metacognition.

These studies also put some light on thought-provoking factors that can impact effectiveness of instructional practices. These include the duration of the metacognition instruction, teachers' fidelity to treatment, and materials. Although it is not defined and discussed well enough, prolonged instruction seems helpful with students' acquisition of metacognition. Also, as Duffy and colleagues (1986) proposed, teachers' consistent efforts to develop students' metacognition assumed. However, for this task, first of all teacher-efforts that help develop students' metacognition needs clarification. Then, these efforts need assessment; therefore, teachers' both fidelity to and adequacy in developing students' metacognition can be evaluated fairly. Moreover, thought-provoking materials can be used to support students' metacognitive development. Such materials can help students practice thinking and strategies to reach cognitive equilibrium and they can also initiate student-discussions for the contradictory parts with peers or in small groups. However, such materials can be context-specific regarding students' diversity with language proficiency, learning needs, socio-economic backgrounds, interests, and motivation towards the subject. As identifying the characteristics and criteria of selecting such materials is beyond the scope of this paper, future research is suggested in this area.

Recent research studies in metacognition instruction. In addition to the pioneering literature that shapes the understanding and practices of metacognition instruction, recent research studies on metacognition training will also be reviewed with the same research selection criteria adopted for this section. Specifically, research studies of the last decade will be examined chronologically to identify any changes or improvements with metacognition instruction practices.

Adopting Pressley and Afflerbach's (1995) proposition; successful comprehension does not occur automatically, rather it depends on directed cognitive efforts, Cubukcu (2008) designed a study to examine the effects of a metacognition treatment. For this purpose, Turkish pre-service teachers were trained with metacognitive strategies during their departmental classes delivered by the researcher. Metacognition training in Cubukcu's study regarded the interaction between personal factors such as enactment of cognitive strategies and situational factors such as task and task demands. The essence of metacognition training was basically built on two central questions; "1. What do I want out of this? (What are my motives?), 2. How do I propose going about getting there? (What are my strategies?)" (Cubukcu, 2008, p.2).

Paricipants in Cubukcu's (2008) study received a metacognition training for 5 weeks. Each week, students received a 45-minute reading comprehension instruction during which two strategies were taught and practiced. In total, students practiced 10 strategies that included; (1) using strengths (individuals exploit their own strengths while reading to support their comprehension), (2) inferring meaning (individuals try to determine the meaning of unknown words critical to the meaning of the text), (3) using background information (individual reconsider and revise their background knowledge about the topic based on the content), (4) evaluating (individuals evaluate the text to determine whether it contributes to their knowledge and understanding of the subject), (5) searching according to goals (individuals search out information relevant to their reading goals), (6) reading goals (individuals evaluate whether their reading is relevant to reading goals), (7) distinguishing (individuals distinguish between information that they already know and new information), (8) deciding on the difficulty (individuals note how hard or

easy a text is to read), (9) revising (individual reconsider and revise their prior questions about the topic based on the content), and (10) guessing the next topics (individuals anticipate information that will be presented later in the text).

Metacognition training was delivered by Cognitive Academic Language Learning Approach (CALLA). The sequence of instruction in CALLA has a recursive cycle of five phases; introducing, teaching, practicing, evaluating, and applying strategies. In the *preparation* stage, teacher explains the importance of metacognitive strategies and helps students set specific goals and plan time considering task demands. The purpose of this phase is to help students identify strategies that they are already using and develop metacognitive awareness regarding mental processes, resources, and their impacts on learning. *Presentation* stage is where the teacher talks about characteristics, usefulness, and application of strategies explicitly. Learners are reminded that strategy-use is a flexible and goal-oriented act and it is impacted by task demands. For this reason, experimental group students were reminded that for example, any single vocabulary strategy (i.e. dividing the word into its component morphemes) may not work in every case and its use may differ in rich-context cases versus context-reduced texts. Moreover, in this stage, the teacher models planning reading, selecting strategies, monitoring effectiveness of strategies with regards to task demands, orchestrating several strategies, and evaluating the effectiveness of strategies on reading. In *practice* phase, students are given opportunities to practice the strategies with authentic tasks. With teacher's assistance, students practice using and regulating multiple strategies flexibly. In *evaluation* phase, students are provided with opportunities to assess their own success. To develop students' self-evaluation, Cubukcu (2008) used self-questioning, debriefing

discussions after strategy practices, learning logs in which learners recorded the results of their strategy enactments, checklists for strategy use, and an open-ended questionnaire examining students' opinions about the effectiveness of strategies that students studied. Finally, the last phase, *expansion* gives students opportunities to use the strategies that they find most effective, apply them to new contexts, and devise their own individual combinations and interpretations.

At the end of the experimental period, both control and treatment groups were given vocabulary and reading comprehension tests and their results were compared. Her analysis showed significantly higher reading comprehension and vocabulary scores on behalf of the experimental group. Experimental group students "stated that being aware of which strategy be used where and when helped them achieve higher grades in the tests" (Cubukcu, 2008, p.9). Cubukcu (2008) also stated that even a five-week intervention program encouraged students to think metacognitively about the strategies for their reading comprehension.

In contrast to Cubukcu's (2008) study, Michalsky, Mevarech, and Haibi, (2009) conducted a phase-dependent metacognition instruction study with 4th graders. As a traditional reading lesson is composed of three phases, Michalsky et al. (2009) investigated the effects of metacognition practices executed (a) before (beMETA), (b) during (duMETA), and (c) immediately after (afMETA) reading scientific texts by measuring any change in students' literacy, domain specific knowledge, and metacognitive awareness.

To implement metacognition treatment, Michalsky et al. (2009) utilized Mevarech and Kramarski's (as cited in Michalsky et al., 2009) IMPROVE method. Presenting

metacognitive strategies through IMPROVE method required students' utilization of four metacognitive questions. These questions pertained to (a) comprehending the phenomenon in the text, (b) connecting previous and new knowledge, (c) solving problems with an appropriate use of inquiry strategies, and (d) reflecting on the processes and the solution. Teachers modeled use of these questions and then helped their students in their small groups to use these questions for task completion. For this purpose, sets of questions were printed and distributed to experimental groups depending on the phase. The beMETA group utilized self-addressed metacognitive questions prior to reading each text. While the duMETA group used the same questions during their reading, the afMETA group received these questions immediately after they finished reading. All students were reminded that these metacognitive questions would be helpful to understand and remember the text. However, noMETA group read the text without questions, discussed it in small groups, and engaged in the tasks after reading the text. They were not explicitly exposed to the metacognitive instruction.

Findings indicated reading scientific texts embedded in metacognitive instruction through IMPROVE was more effective in developing students' scientific literacy than reading without any metacognitive instruction. Within group comparison showed that students in afMETA group significantly outperformed all other groups on all variables assessed.

Van Keer and Vanderlinde (2010) are among the few who noticed the discrepancy between research and classroom realities with regards to students' metacognition. They, therefore, intended to bridge these two by contributing to the understanding of educating

self-regulated learners. For this purpose, they implemented an intervention program that used explicit strategies instruction and peer-tutoring for an entire school year.

Explicit strategies instruction included 7 essential strategies that were nominated by the previous literature. These were "activating prior knowledge, predictive reading, distinguishing main issues from side-issues, monitoring and regulating the understanding of words and expressions, monitoring and regulating general text comprehension, classifying types of text, and representing tests schematically" (Van Keer & Vanderlinde, 2010, p. 35-36). These strategies were opted for instead of focusing on one stagey at a time.

The training followed a gradual transfer from teacher's regulation to students' self-regulation. Teacher's explicit explanations and modeling by thinking aloud was followed by students' practices where teachers' coaching and scaffolding was still colored in. To facilitate students' self-regulated cognitive enactments, Van Keer and Vanderlinde (2010) utilized peer-led interactions. "Through discussions, peer conferences, peer tutoring, and cooperative activities students implement, evaluate, and modify strategy acquisition and use and discuss strategy application" (Van Keer & Vanderlinde, 2010, p.34). For peer interactions, Van Keer and Vanderlinde (2010) employed cross-age tutoring. For this reason, before peer-led discussions, tutors learnt how to show interest, initiate and finish a session, give feedback, provide praise, and offer explanations and assistance. Then, older tutors were paired with younger tutees for their weekly sessions that lasted either a 50-minute or two 25-minutes.

To determine the effectiveness of metacognition training, any possible change in students' reading strategy awareness and reading strategy use was measured by

standardized measures (i.e. the Index of Reading Awareness and the Reading Strategy Use scale). Similarly, reading comprehension was assessed by standardized tests that consisted of three modules of 25 multiple-choice questions. Pre-test and post-test analysis revealed that there was a significant increase in experimental group's scores. More specifically, 3rd graders' overall reading strategy awareness especially regulating reading increased. In contrast, there was not significant improvement in sixth graders overall stagey awareness following the treatment. However, a positive change in six graders' awareness of evaluating tasks, goals, and personal skills was found. Moreover, both third and sixth graders' overall reported metacognitive and cognitive strategy use significantly improved for experimental groups. However, there was no significant difference between control and experimental group students' reading comprehension achievement (at both grade levels). This might be because of the fact that "it can take years before students become true strategic years" (Van Keer & Vanderlinde, 2010, p. 41).

A recent study done by Çer and Şahin (2016) similarly investigated the impacts of metacognition training in the domain of reading. In this study, Çer and Şahin (2016) trained adolescents who attended the first year of secondary school (5th grade) in Turkey. Students in the experimental group were trained with metacognitive strategies for 8 weeks by a structured instruction model. The instruction was composed of three parts; what to do (a) before, (b) during, and (c) after reading. Before reading, students were asked questions to activate prior knowledge, to initiate reasoning for predictions, and to overview the text and task, to determine potential strategies and resources, and to allocate appropriate time and manifest flexibility during task completion. For during reading, students were instructed in self-monitoring and provided with 4 questions to regulate

their comprehension. These questions pertained to comprehension monitoring, task's personal relevance, checking goal attainment, and strategy regulation. Moreover, after reading students were similarly asked a set of questions. These questions related to students' reflections on their reading experience including their awareness of strategies and resources used for task completion, problems emerged during task completion, associating prior knowledge and new information, self-evaluation as a reader, and one's predictions with regards to possible future reading experiences. On the other hand, students in the control group were instructed in "conventional teaching within the Turkish teaching program" (p. 113). That is, students in the control group did not apply any strategies, but some question with regards to the book. Students were asked for some text explicit and implicit questions.

To measure the impacts of metacognition training on students' reading comprehension, a 42-item test was developed after its validity and reliability was confirmed. It included multiple-choice questions assessing students' comprehension skills and it was composed of international and national literary texts. The texts and questions were thought appropriate to students' cognitive and linguistic levels. An analysis of pre-test and post-test reading scores revealed that metacognition training benefited students' comprehension. Experimental group's reading scores were significantly higher than control group's and it differed as a function of group membership.

Lastly, Varga (2016) reported findings from her observation study that was done to improve students' metacognition. The students were Swedish 6th and 7th graders instructed by teachers who attended professional development seminars on the theories of

reading and research-based reading interventions. The teachers studied reciprocal teaching, transactional strategies instruction, and Socratic dialog. Following the seminars, teachers implemented textual discussions to help students learn metacognitive operations related to reading comprehension. For this purpose, the gradual release of responsibility framework was utilized. That is, the discussions were initially led by the teachers, then students started to take over the responsibility to maintain small group and peer discussions.

The present study only reports observed teacher-behavior that support students' metacognition during the teacher-led discussions in the experimental group. Varga (2016) reported that for students to develop metacognition adequacy, the teachers had students reflect on their own queries, approaches, or viewpoints and verbalize the thought processes for reading comprehension. Teachers also explained when and why to use reading strategies by meta-language that relates to the terminology taken from the literary studies. Moreover, the teachers also helped students reflect upon the interactions between the text and reader; how readers can produce different meanings by reading the same text. In exchange of such instruction, students were observed to be able to implement metacognitive operations; identify their queries, approaches, and viewpoints, verbalize their thought processes, communicate their use of reading comprehension strategies, and recognize the interaction between the text and themselves. However, the impact of metacognition instruction on students' reading performance scores was not assessed. Like teacher-behavior, student- metacognitive behavior observed during the teacher-led discussions.

Summary of recent research studies in metacognition instruction. Recent research studies helped confirm the goal and nature of metacognition instruction and identify potential gaps regarding its implementation. Research studies aligned with the argument that TSI previously proposed. That is, rather than teaching students certain strategies, instruction had better help them to develop a mind-set of strategic reading that is not limited to certain strategies, but with the help of strategies (Pressley et al., 1992). Research showed that strategic reading requires cognitive strategies dissolve into metacognitive strategies. That is, individuals can plan reading by for example activating prior knowledge, predicting, goal-setting, and using textual clues, monitoring and regulating comprehension by identifying main idea, using textual clues, and visualization, and evaluating reading outcomes by self-questioning or evaluating strategies or comprehension. In fact, these means -cognitive strategies- can vary depending on reader characteristics, the task, and situational demands.

Moreover, instructional practices reviewed in this section aligned with the understanding of gradual release of responsibility and informed training. Raising students' metacognitive knowledge by explicit teaching of the strategies and teachers' modeling strategic reading by thinking aloud was still upheld. Guided practice of strategic reading and cooperative work was also a part of metacognition instruction. Teachers still coached and scaffolded students for metacognitive expertise. Students practiced thinking about a text in small-groups or with peers. It is only recently that the language that help verbalize thought processes and students' thinking aloud was pointed out. However, except teachers' metacognitive questions or teacher-led discussions, teacher-behavior initiating and empowering students' metacognition was not sufficiently

depicted. That is, for example although students' initial strategy practices were recommended by teachers' coaching and supervision, it was not clear *what exactly* teachers scaffold while students practice strategic reading. This might be because teacher-behavior developing students' metacognition was taken granted as Duffy et al. (1986) previously touched upon. In these previous studies, ironically either researchers instructed students for metacognition or teachers were provided with instructional scripts to initiate students' metacognitive behaviors, if they were not trained to implement such an instruction beforehand. However, without teachers' competency in teaching metacognition, such instructional routines might not be guaranteed in mainstream classrooms.

Furthermore, similar to instructional approaches disseminated in the previous section, recent research studies tested the effectiveness of treatments by reading scores. However, without examining individuals' metacognitive adequacy and change in their adequacy following the treatments, a *statistically significant difference* in reading scores might be invalid. Reading scores might change; however, such a change might result from any other potential factor, such as instrumentation, novelty of the instruction, achievement motivation, or experimenter's effect.

The review of recent research studies also help conclude that the emphasis on prolonged metacognition training seems to be still valid. The length of research treatments still aligns with that individuals need to practice strategic reading under the guidance or supervision of experts until a satisfactory level of mastery is accomplished. However, there is a lack of clarity regarding the understanding of prolonged training. That is, although research treatments lasted at least a month, variations might be observed

depending on the schooling level. It seems that treatment periods shorten as education level rises. Because research did not carry follow-up analysis and did not report sustained impacts of metacognition trainings on reading, timeframes for metacognition instruction might be considered theoretically prolonged. However, practical implications might challenge the understanding of prolonged training. Therefore, research-informed evidence is needed to define prolonged training and to determine appropriate timeframes for metacognition instruction that end up with students' independent strategic reading.

In addition to these approaches to and studies of metacognition instruction, in the following some techniques or methods will also be reviewed to empower the understanding of metacognition instruction. As Duffy and his colleagues (1986) emphasized, vague descriptions like discussions, questioning, dialogues, and modeling may not support some teachers' understanding of teaching metacognition. Therefore, instruction had better be saturated as much as possible.

Selected supplementary instructional techniques for metacognition instruction. "[T]he aim of good strategy instruction is to provide opportunities for students to personalize strategies" (Borkowski & Muthukrishna, 1992, p.492). For this purpose, students need to be active, purposeful, and reflective while they construct a strategy-repertoire. In the following some instructional techniques that can help individuals personalize metacognitive strategies will be reviewed. Including self-questioning ("what is Known, Want to learn, and what is Learnt"), "Questioning the Author," and think-aloud, following supplementary techniques can also help illustrate previous approaches to metacognition instruction better.

Self-questioning. Questions are important components of classroom discourse as they promote students' active processing of given materials and thinking, productive learning, and content retention. However, when they are used as a habitual routine by teachers, questions can be counter-productive (Williamson, 1996). As the ultimate goal of education is to teach students to think, classroom instruction should lead to self-questioning.

Self-questioning "is a metacognitive process of reading which enables students to become independent in their understanding of text" (Williamson, 1996, p.31). As stated by Wong (1985), to generate self-questions one must have an awareness of (a) the utility of clarifying and comprehension monitoring and (b) task demands. To develop students' competency in self-questioning, teachers need to explain, model, and provide students with practice opportunities of asking and answering self-generated questions. Therefore, students can recognize the impacts of such questions on their active engagement with the task and the text through goal-directed and organized thinking (Williamson, 1996; Wong, 1985).

Reviewing 35 experimental research studies that involved teaching self-questioning to K-12 students, Joseph, Alber-Morgan, Cullen, and Rouse (2015) found that "self-questioning strategies improves reading comprehension across students in various grades and across students with and without disabilities" (p.166). They also found that self-questioning can be practiced in various forms including KWL. In the following KWL is depicted as an instructional example manifesting self-questioning in the classrooms.

Developed by Ogle (1986), KWL basically requires readers to attain three steps: accessing what is Known about the topic, determining what one Wants to learn, and recalling what has been Learnt. For the first two steps, student-teacher dialogues matter. To identify what is known about a topic or a specific stimulus, teachers had better prompt students brainstorm and activate prior knowledge. At this stage, it is important to deepen students thinking by not simply accepting their statements but "probing to make them think about the sources and substantiveness of their suggestions" (Ogle, 1986, p.566). In this stage, students and teacher can generate some questions like "What do I know about this topic? How do I know about it? Is what I know trustworthy or not?".

Following the activation of prior knowledge, students can set a reading goal, generate some assumptions or make predictions so that they can determine what they want to learn (W). For this purpose, students can ask some questions like "What do I want to learn? Why do I want to learn about this? What good it has to do with task demands?" Such questions can help students set a purpose orienting their attention and comprehension monitoring constantly against their goal.

In the last stage (L), students summarize what they learnt. As they have certain goals or predictions in mind, students check whether their reading help master goals, answer questions, or verify predictions. This stage is where students come to realize that "[r]eaders need to be in charge in their learning and actively pursue their own quest for knowledge" (Ogle, 1986, p.567). For this reason, it is important to develop a mind-set that searches for questions and that cannot be limited to an author's choices of expression. Students need to recognize that purist of knowledge extends beyond what is available to the eyes; pursuit of knowledge, in fact, is a self-directed journey.

Utilizing gradual release of responsibility framework, initially teachers can model for example, using a KWL chart and then let students adopt it by guided and independent practice opportunities. Helping with detecting the central ideas and organizing them in a way achieving personal goals and task demands, KLW is a useful technique to support students' awareness, independence, and transfer of useful strategies to future performances (Carr & Ogle, 1987).

In addition to questioning self, metacognitive approaches to reading can also benefit from questioning the author as knowledgeable readers try to figure out what the author had in mind while writing his text. In the following, this routine will be described shortly.

Questioning the author. Beck and McKeown worked on a comprehension routine called Questioning the Author (QtA) and developed a set of generic questions for students' querying text segments and collaborative discussions. These questions can look like as in the following: "What is the author trying to say? Has the author said this explicitly? Why or why not? What do we need to figure out or find out? How does that relate to what the author has already said? What do you think the author intends you to find out by saying this?" (Beck, McKeown, Sandora, Kucan, & Worthy, 1996, p.387). By these questions, students can develop a critical disposition toward the text and meaning construction (Duke & Pearson, 2008). Indeed, through the dialogues with the author, students can "depose" the authority of the text by actualizing the presence of an author as a fallible human being" (Beck et al., 1996, p.387). Comprehension difficulties, therefore, can be attributed to authors' fallibility as long as students "question text ideas and dig into their meaning" critically (Beck et al., 1996, p.387).

Transforming text discussions from traditional recitations to more student-centered, interpretive, and critical discussions, QtA also encourages students make thinking public. As students need to contribute to discussions with detailed explanations or explanatory responses, they had better not only monitor their comprehension closely but also react to text thinking critically. (Beck et al., 1996; Duke & Pearson, 2008).

Finally, in the following think-aloud technique will be reviewed shortly as almost all previous literature advocated for both teachers' and students' making thinking explicit or public.

Think aloud. Students may be exposed to the knowledge of strategies during explicit instruction and even they can imitate the procedures of approaching a text that have been modeled. However, these practices may not necessarily help students internalize strategies and use them independently. Because reading is a constructive act that requires individuals' active and strategic task engagement, to help students recognize meaning construction out of print, to make the impacts of strategies on comprehension vivid, and to identify students' difficulties with meaning making, think-aloud technique can be used.

Think aloud, as its name implies, involves the overt verbal expressions of covert mental process while constructing meaning strategically (Baumann, Seifert-Kessell, & Jones, 1992; Garner, 1987). In fact, while engaged in cognitive tasks, "children not only *act* in attempting to achieve a goal but also *speak*" (Vygotsky, 1978, p.25). Children's "speech and action are part of *one and the same psychological function,* directed toward the solution of the problem at hand" (Vygotsky, 1978, p.25-26). In alignment with

Vygotsky's (1978) theory, think-aloud technique can be explained in relation to inner and private speech better.

Inner speech pertains to the internalization of an expert's speech which was once an external aid for child's cognitions. By inner speech, children create opportunities to solve problem by creating "stimuli that do not lie within the immediate visual field" (Vygotsky, 1978, p.26). By using words, children can create a specific plan, overcome impulsive action, search for and produce solutions prior to its execution, carry out the prepared solution by applying necessary tools, control and master their behavior, and plan future actions. That is, inner speech is a tool for and form of thinking. By private speech, children speak out their thought. As it can be considered a form of think-aloud, private speech helps children communicate with oneself. By thinking-aloud, children can self-direct and self-guide in the process of understanding and solving a problem (Vygotsky as cited in O'Donnell, Reeve, & Smith, 2007, p.53).

Decreasing students' impulsiveness, think-aloud is one of the effective techniques improving comprehension (Duke & Pearson, 2008; McKeown & Gentilucci, 2007). In relation, asking students to think-aloud their reading purposes, strategy selection and application, and meaning-making can help students' strategic reading instead of "jumping to conclusions about text meaning or moving ahead in the text without having sufficiently understood what had already been read" (Duke & Pearson, 2008, p.111). As Baumann, Seifert-Kessell, and Jones (1992) found, training novice readers in think-aloud can help with the awareness and use of comprehension monitoring strategies and can initiate a thoughtful, conscious, and strategic approach to reading.

Summary of selected supplementary instructional techniques for metacognition instruction. In this short section of selected instructional techniques for metacognition instruction, it is concluded that educating metacognitive readers pertains to developing dispositions of thinking. None of the techniques reviewed in this section was prescriptive or procedural; but rather they focused on improving students' knowledge about strategic reading and initiating their thinking about the text. Instead of limiting students with procedural steps of reading, all techniques aimed to develop organized and goal-directed thinking to master successful comprehension or task performance. With an awareness of self and task demands, knowledge about various strategies, reasoning, and questioning substantiveness of the knowledge, students can engage in purposeful and reflective reading experiences. They can become active knowledge builders, rather than passive consumers of information.

Reflections on Metacognition and Metacognition Instruction

Paris and Winograd (1990) stated that despite the virtues of metacognition for reading, its definition is "fuzzy" (p.19). Rather than inclusive operational definitions, there are prototypical definitions for metacognition. It might be because "[a]ny cognition that one might have relevant to knowledge and thinking might be classified as a metacognition" (Paris & Winograd, 1990, p. 19). However, such arguments might lead to fundamental discussions about whether metacognition is awareness of thinking or not. In the field, some may think that it is unconscious and tacit while some others focus on awareness by referring to reports for example, think aloud protocols that help bring individuals' cognitive and metacognitive strategies into consciousness. An analytic

differentiation between these two levels of thinking, however, is beyond the scope and purpose of this study.

In relation to prototypical definitions of metacognition, there emerge some difficulties with its research and instructional practices. It is important to recognize that previous literature including meditations and research studies present cognitive and metacognitive strategies without clearly distinguishing them from each other. In fact, this approach aligns with Pressley and Afflerbach's (1995) constructively responsive reading and in general Nelson's (1996) conceptualization of cognition and metacognition in the Model. That is, readers' meaning construction and their utilization of cognitive strategies for this purpose might be an element of metacognition. However, when researchers list a set of strategies, it might be difficult to distinguish two levels of cognition regarding instructional purposes. For example, Israel (2007) identified a set of strategies helping comprehension and these include overviewing, looking for important information, relating important points in the text, activating prior knowledge, relating text content to prior knowledge, revising meaning, revising prior knowledge, inferring, determining word meaning, changing strategies, evaluating, reflecting, conversing with the author, and anticipating use of knowledge. Although these strategies might necessitate metacognition, not all teachers or students can see the relevance or importance of metacognition (Veenman et al., 2006). When teachers ask, for example some topic related questions, all students might not understand that activating prior knowledge is a tool to make predictions and to plan reading accordingly. As argued in previous sections and as research evidence has supported, to develop students' autonomy and ownership in reading, metacognitive strategies need to be elaborated on distinctively and explicitly.

Therefore, the substantive distinction between cognition and metacognition needs to be elaborated.

Based on my academic readings, personal learning, and teaching experiences, for the interest of this research, I propose that the distinction between cognition and metacognition lies in *awareness* and *reasoning:* awareness pertains to cognition and reasoning pertains to metacognition. To perform some mental work, one needs to be aware of the fact that he or she is executing cognitive acts (mental work) and for this act, he or she can use tools. To illustrate, when a child reads, he is aware of his cognitive engagement and he can name it. If a child who holds a book is asked some questions like "What are you doing?" he can respond back saying "Reading… Looking at the pictures… Look at this red car, you see?" In this instance, the child is aware that a combination of print on a page is to decode and some tools such as letters and pictures can be helpful. He has seen similar objects (books) before and built a proper schema of reading that supports his interaction with the necessary objects.

The same child, who holds the same book, looks at the same pictures, and proposes he is reading, might not in deed comprehend the text. When he is asked a question like "What are you reading about" he may respond back "reading… about a red car." However, this does not necessarily mean that he is able to relate what he is reading to a goal or previous knowledge and resolve blockages to meaning. On the other hand, when he encounters a thought-provoking question for example, "Ah, you are reading about a red car, interesting!! Why are you reading about it?" he may end up saying "I love cars…(uhmm) Red is my favorite color…And Jerry (a cartoon character) has a red car, it was fast." Although he may not refer evidently to his thinking about the text and

reasoning for his reading, his response, in fact, holds metacognitive reminiscent. That is, he is reading about cars because of his *personal interests*. He is interested in cars and he can relate his reading to his life or *previous learning*. Moreover, if he is asked another simple "Why?" question, which most children naturally and excessively use, his thinking becomes overt. For example, when he is asked "Why are you reading a book about a red fast car?" he may end up saying "I am reading this book because I love fast cars, and this car drives around the world. I want to learn about it." This answer, in fact, reveals *his goal* to read. Another subsequent question for example, "Why do you want to learn about this fast car?" can provide a more informative answer as; "Because maybe, one day I can make one for myself and travel around the world." The conversation might dig his thinking about the text more by other questions.

Reasoning about ones' engagement in cognitive acts can help identify interests or goals. However, processing cognitive acts might not be as smooth. Individuals can experience interruptions and difficulties to realize goals. When the same child cannot comprehend the text because of for example, unfamiliar words, he might give up on reading because the challenge might be too much. Although the child is interested in cars and although he wants to learn about travelling around the world, he might not continue reading. If he does not know how to remove blockages to comprehension, he will most probably sacrifice or at best, modify his goal. Instead of thinking about why he does not know about for example, "muffler" and how to deal with such a difficulty, the child stop reading. As seen in the example and as Fisher (1998) proposed, "cognitive activity does not necessarily include the metacognitive" (p.9).

On the contrary, when the child is guided to think why he cannot understand the text and scaffolded to resolve this difficulty, he may experience success. In the following, a more competent model negotiates his regulation of strategies to comprehend the text and models the child how to resolve a similar problem. “I see, this book may be a bit difficult for you. Do you think so? This word (pointing to the vocabulary item) is weird. I have never seen or heard of it, have you? Hmm… But, there are some tricks for such problems. Now, turn the last page of the book. Here, it says *muffler*. Let’s see what it is. It says *muffler* is a silencer for a car. Aha!! This is like a sound killer. It helps the car drive silently; therefore, we can travel comfortably. OK, now we know what a muffler is. We can continue reading.” In this case, the child was scaffolded to think about why he cannot understand a section and to reason a strategy to deal with a reading difficulty.

In the interest of this research, classroom metacognition instruction is bound to an understanding that *people can share knowledge about and regulation of cognition* (Paris & Winograd, 1990) as depicted in the previous research studies. Although there are slight differences in unique approaches to metacognition instruction, common features align with gradual release of responsibility framework. Based on the previous literature review, it is concluded that metacognition instruction in reading pertains to teaching students metacognitive knowledge and strategies. Metacognitive instruction can be implemented by;

- ✓ goal-setting
- ✓ utilization of language of thinking
- ✓ explicit explanation of reciprocal relation between cognitive and metacognitive strategies

- ✓ informed training of strategies
- ✓ explicit teaching of strategies
- ✓ modeling strategies; how and when to use strategies by analogies, graphic organizers, thinking, and reading aloud
- ✓ guided practice of strategies; worksheets, small group practices, graphic organizers, teacher feedback and scaffolding
- ✓ reasoning by self-questioning and questioning the author
- ✓ peer or group interactions; questioning others' thinking, discussions, negotiations, reflections, peer-support and scaffolding
- ✓ transfer of metacognitive control to students via independent practices
- ✓ teacher-assessment of students' strategic reading
- ✓ students' self-assessment of performance, strategy use, and reading capabilities and characteristics
- ✓ situated learning
- ✓ prolonged training

From Cognitivism to Constructivism: Metacognition Can be Successfully Taught

In the previous sections, it became clear that metacognition is teachable and teacher's role in metacognition instruction pertains to "talking, showing, enacting or otherwise representing the ideas so that the unknown can come to known… the unskilled can become adept" (Shulman, 1986, p. 20). It also includes coaching, scaffolding, assessing, and providing feedback on students' metacognitive adequacy. However, none of the previous research disseminated the impacts' of "others" rigorously as they were nested in the cognitive domain of learning. Therefore, social perspective of learning will

be reviewed in the following to help conceptualize a pedagogy of metacognition and specify teaching metacognition behavior.

Social perspectives of learning. Social perspectives of learning incorporate many learning theories that emphasize the role of "others" and social interaction in the development of knowledge and learning. For the purpose of this study and in consideration of the insights gained from the previous literature review on metacognition instruction, social cognitive theory (Bandura, 1986, 1971), self-regulated learning (Zimmerman, 2002, 2000), and social constructivism (Vygotsky, 1978) will be elaborated in the following.

Social learning theory. Recently called Social Cognitive Theory, Social Learning Theory (SLT) combines the features of Behaviorism and social learning and it describes a system of triarchic reciprocal causality. That is, a social cognitive perspective of learning embraces the dynamic interplay among personal, behavioral, and environmental influences on learning (Bandura,1986; 1971). While personal influences pertain to factors such as cognitive ability, knowledge, and expectations; physical and social environment can include resources, consequences of actions, models and teachers, and physical settings (Woolfolk, 2016). On the other hand, behavioral influences can be in various forms like actions, choices, and verbal statements (Woolfolk, 2016). By observing, encoding, retaining and retrieving knowledge of others' behaviors, efforts, and the consequences of these efforts, people can reason and learn new skills from more competent models. That is, learners can construct knowledge in a social environment through vicarious learning (O'Donnell et al., 2007; Zimmerman, 2000).

One of distinctive features of social cognitive theory is observational learning. By observational learning, individuals "discover not only *how* to perform a behavior but also what will happen" once they perform it in a specific situation (Woolfolk, 2016, p.415). Individuals can also compare their performances with those of models and identify necessary adjustments to produce better performance outcomes, if required at all (Woolfolk, 2016). To learn new behaviors and refine current abilities, individuals can experience four stages of observational learning that can mainly be grouped in acquisition and performance. The first two stages pertain to acquisition. To acquire a behavior, individuals need to attend and remember the behavior. During attentional phase, observers watch a model performing components of learning. By selective attention, individuals need to recognize correct clues and information and by sustained attention, they also need to maintain their focus (Woolfolk, 2016). At this stage, a teacher had better help direct students' attention to important features of learning element or behavior (O'Donnell et al., 2007) and highlight these features by clear presentations to keep students focused (Woolfolk, 2016). On the next stage (retention phase), observers think about and process what they have observed. Therefore, they can imitate it later. For this purpose, individuals need to represent the model's actions mentally; "probably as verbal steps… or as visual images, or both" (Woolfolk, 2016, p.416). Retention can be improved by some strategies such as mental rehearsals, synonyms/acronyms, abbreviations, or by actual practices of the target behavior (O'Donnell et al., 2007; Woolfolk, 2016).

The following stages pertain to performance and they involve students' reproduction and continuous practice of the target behavior. The third stage of observational learning is called production phase and during this phase observers imitate

and repeat the behavior or procedures that has been modeled. However, as O'Donnell et al. (2007) and Woolfolk (2016) stated, individuals may not perform the target behavior smoothly and it might be awkward initially. To refine their behavior, individuals need a great deal of practice, feedback, and coaching (Woolfolk, 2016). Through the reinforcement phase, observers are reinforced towards modeled behavior by the comparison of individual's performance to the modeled ideal behavior (Woolfolk, 2016). The last stage of observational learning, in fact, discloses the dichotomy between acquisition and performance. Although individuals may acquire a new skill or behavior, they may not perform it for several reasons. As Woolfolk (2016) stated, to help individuals produce desired behavior, reinforcement can be used. Bandura identified three forms of reinforcement. These include (1) direct reinforcement that comes from the model to strengthen the novices' learning, (2) vicarious reinforcement that shapes observers' learning by their own interpretation of the consequences of others' actions, and (3) self-reinforcement that pertains to observer's control over intrinsic or extrinsic reinforces. On the contrary to the common assumption that observational learning is just an imitation of what is modeled or production of the desired behavior by stimuli and reinforcement, Bandura (1986) highlighted that individuals need to use their cognition and reasoning in order to interpret others' behavior and its consequences. Therefore, they can appreciate, take initiative to practice, and produce similar behaviors during observational learning.

Self-regulated learning. Years later, Zimmerman (2000), influenced by Bandura's ideas, described developmental states of regulatory skills. Basically, adjusting Bandura's observational learning to self-regulatory strategy learning, Zimmerman (2002)

stated that at the *observational level*, learners can induce major features of the strategies by watching a model learn or perform strategies. At this stage, the model explicitly conveys self-regulatory processes. At the *emulation level*, the "learner's behavioral performance approximates the general strategic form of the model" (Zimmerman, 2000, p.30). As internalization of the strategies requires more than simply observing competent models, before individuals start to practice the strategies deliberately and independently, two social processes; co-regulation and shared regulation can be benefitted (O'Donnell et al., 2007; Woolfolk, 2016). Co-regulation refers to the transitional phase that students and teacher jointly self-regulate cognitions (O'Donnell et al., 2007; Woolfolk, 2016). For students to gradually approximate and internalize self-regulation, teachers can

> provide choices, offer flexible decision making, create opportunities for the student to control task challenge and task difficulty, communicate rich verbal descriptions that answer the student's what, how, why, and when questions, share the responsibility for learning, make time for open-ended activities, and evaluate in nonthreatening and mastery-oriented ways (O'Donnell et al., 2007, p. 164).

As O'Donnell and her colleagues (2007) stated, it is especially important not to harm students' motivation to emulate and resilience to internalize teacher's regulation strategies. Next, students can work together and help each other regulate cognitions through reminders or prompts. This is when shared regulation occurs (Woolfolk, 2016). As individuals develop success in applying skills, they start to demonstrate mastery using self-regulatory strategies in structured settings without the presence of the model (O'Donnell et al., 2007; Woolfolk, 2016).

The next two phases are where students start to take over the stage. At the *self-controlled stage,* students master use of self-regulatory strategies in structured settings without the presence of a model. Indeed, rather than a social referent, representational

standards like covert images or verbal recollections of the ideal performance are used as reference-points (Zimmerman, 2000). At this level, learners' self-reinforcement help approximate success by matching the covert standards for proficient strategy use with their practice and efforts. Finally, at the *self-regulatory level*, learners can set their goals and systematically adapt their strategies and regulate performances to changing conditions and outcomes. Learners can choose strategies and adapt their features with little or no dependence on the model. Strategies that become skills can be performed with minimal process monitoring and attention can be shifted towards outcomes without detrimental consequences. Students can also reflect on their cognitive processes and evaluate performances with regards to personal goals, task-demands, and strategy-use (Woolfolk, 2016; Zimmerman, 2000).

Since Zimmerman's and Bandura's models touch upon modeling, coaching, and guiding the observer and providing feedback and reinforcement for his efforts, there is a need to review social constructivism. More specifically, in the following the role of language, scaffolding, and zone of proximal development will be reviewed to enrich the understanding of teaching metacognition in classrooms.

Social constructivism. Vygotsky's (1978) influence on metacognition instruction can be recognized by his discussions on the functions of language (private and inner speech) and the interactions with others (transference from other-regulation to self-regulation).

To Vygotsky (1978), cognitive development pertains to enrichment of task-specific knowledge and skills through guided participation and with some tools rather than individuals' arbitrary exploration or discovery of these skills or knowledge on their

own (Fischer, 1980; O'Donnell et al., 2007). These tools, in fact, are distinctive components of a sign system on which development depends and individuals grow with. Sign systems include a culture's language, writing, and counting systems. By mastering and manipulating, for example, alphabets, words, listening, speaking, reading, and writing, children gain the tools to think about and respond to the world (Vygotsky, 1978). In fact,

> [t]hese tools allow children to transform their thinking by enabling them to gain greater and greater mastery of their own cognitive processes; they advance their own development as they use the tools…In Vygotsky's theory, language is the most important symbol system in the tool kit, and it is the one that helps to fill the kit with other tools" (Woolfolk, 2016, p.59).

According to Vygotsky, language has a mediating role in thinking, directing, and regulating cognitive acts (Tishman & Perkins, 1997; Woolfolk, 2016). Individuals gain control over their reflective awareness and on their cognition by verbalizing their own mental processes (Vygotsky, 1978). That is, private and inner speech can guide cognitive development in a form of self-instruction (Vygotsky, 1978). Private speech pertains to one's talking to oneself and it helps individuals to move in the stages of self-regulation (Woolfolk, 2016). Around the age of 4 or 5, children start to self-direct their problem-solving actions and self-instruct their cognitions by speaking aloud. For this, children may repeat the words of teachers or competent peers (Woolfolk, 2016). However, around the age of 7, children's self-directed speech changes from spoken to whispered speech and then it becomes silent lip movements (Woolfolk, 2016). Vygotsky (1978) called this inner speech and it is recognized as a form of verbal thinking. This transition from spoken words to silent inner speech supports the argument that "higher mental functions first appear between people as they communicate and regulate each other's behavior, and

then emerge again within the individual as cognitive process" (Woolfolk, 2016, p.60). On the other hand, private and inner speech is linked to children's social speech by many transitional forms. The link between inner and communicative speech becomes visible, especially when children cannot solve problems on their own. Sometimes children turn to adults and verbally describe the method that they cannot carry out on their own. Therefore, children's' language can function both at an interpersonal and an intrapersonal level (Vygotsky, 1978).

In relation to the functions of language and internalization of socially shared activities, zone of proximal development (ZPD) and scaffolding are prominent features for the cognitive development. According to Vygotsky (1978), children has two developmental levels: actual development level and level of potential development. At the actual developmental level, children can deal with tasks independently; however, at the level of potential development children can deal with task or solve problems with the help of more competent peers or expert adults. The area between these two is zone of proximal development (ZPD) and it is the ideal level where cognitive development grows (O'Donnell et al., 2007).

Vygotsky (1978) defines ZPD as "the distance between the actual development level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (p. 86). For children to surrender in the ZPD, the critical role of scaffolding needs recognition. Although Vygotsky never used the term "scaffolding," he conceptualized it by stating that "we might study the development…by making available to them [children] new means for solving the given task and then

observing the degree and character of their problem-solving efforts (1978, p.74). Without scaffolding, which is the guidance, support, and assistance from adults or more competent peers provided to individuals during social interactions for learning (O'Donnell et al., 2007; Rosenshine & Meister, 1994), a variety of processes like internal speech and reflective thought may not develop and operate.

As O'Donnell and colleagues (2007) stated, scaffolding can typically start with "teacher's planning and structuring of the lesson, such as setting up the learning activity, defining the learning goals, and modelling what an idealized performance look like" (p. 50). As the lesson progresses, scaffolding might include instructional acts like "hints, tips, reminders, examples, directions, challenges, explanations, prompts, and well-timed questions and suggestions" (O'Donnell et al., 2007, p. 50). It may also include simplifying the task, encouraging students' to set short-term goals, and teachers' demonstration of skills and thought processes; "walking students through the steps of a complicated problem [by thinking aloud], doing part of the problem…; giving detailed feedback and allowing revisions" (Woolfolk, 2016, p.64). Scaffolding is to help students become independent and self-regulated learners "who are more self-sufficient and less teacher-dependent" (Hartman, 2001a, p.49).

Scaffolding, however, is a one-on-one process; the teacher assists one student's learning (O'Donnell et al., 2007). When scaffolding principles are applied to group-learning, the mentoring is called *instructional conversations* (O'Donnell et al., 2007, p.51, emphasis in original). Instructional conversations are two-way discussions that students try to make sense of the topic by informing, debating, and persuading each other (O'Donnell et al., 2007). By instructional conversations, students acquire new knowledge

or skills in a community of learners (Rogoff, Turkanis, Bartlett, 2002 as cited in O'Donnell, et al., 2007). For this purpose, PQS that is a discourse model of probe, question, and scaffold can be used. PQS discourse model starts with teacher's probing or investigating what students think and know initially, continues with questioning the basis of students' thinking, and ends in scaffolding students towards a deeper understanding. By instructional conversations, students are encouraged to reflect on their thinking, develop their reasoning, and defend or justify their thinking. When such a convention is used, a community of learners who gain control over their thinking can emerge (O'Donnell et al., 2007).

O'Donnell and colleagues (2007) stated that students can benefit from scaffolding and instructional conversations regarding inter-subjectivity and transfer of responsibility. Inter-subjectivity pertains to a shared mutual understanding of how to manage a problem-solving situation. It is an intellectual bridge extending students' understanding (Vygotsky, 1978) rather than something students lack and teachers have (O'Donnell et al., 2007). By inter-subjectivity, students work collaboratively with teachers to "formulate a shared focus of attention, shared intentions, shared strategies, mutual engagement, shared emotions-a joint understanding of how to develop skills and solve problems" (O'Donnell et al., 2007, p.52). Transfer of responsibility, on the other hand, pertains to students' accomplishment of sub-goals of the activity, acquisition of the skills and knowledge, and less need for assistance. Initially, teacher takes the full responsibility for students' learning. That is, the teacher selects the activities, sets goals, models expert performance, and teaches explicitly (O'Donnell et al., 2007). In time, the communication between the students and teacher becomes more symmetric. Students show less hesitance

and frustration and displays necessary knowledge, skill, and leadership more while the teacher leads students to share their expectations, explanations, and decision making. Eventually, students assume full responsibility for learning; they choose activities, structure the task, set goals, implement strategies, provide self-reminders, and decide whether and when outside help is needed (O'Donnell et al., 2007; Woolfolk, 2016). That is, the interrogative and regulatory role of the *other* diminishes as the individuals can fulfill higher order mental functions on their own (Vygotsky, 1978).

Summary of social learning theories and implications for metacognition instruction. Considering the fundamental understanding of these socially oriented learning theories and gradual release of responsibility framework, the functions of language and the premises of observational learning, zone of proximal development, and scaffolding can specifically benefit a pedagogy of metacognition in reading.

For a child to internalize higher order thinking, he, first of all, needs to recognize its existence and benefits. Adopting observational learning principles, a model or a competent partner can help with this initial recognition. However, to consolidate children's experiences with strategic reading, as Bandura (1986; 1971), Vygotsky (1978), and Zimmerman (2000) suggested students need modeling, practice, and get scaffolding and reinforcement for their endeavors. Exposed to the idea of strategic reading and modeled how to read so, children can initially practice strategic reading with the assistance either from the teacher, from a more competent peer, and with instructional tools. To facilitate students' autonomy and simultaneously to scaffold their experiences with strategic reading, children's thinking aloud and reasoning during their strategic reading needs encouragement. During guided practices, students' misconceptions, needs,

or problems with strategic reading can be identified. Therefore, students can be given appropriate feedback, reinforcement, and support for their future experiences. By walking from the teacher-directed, through teacher-shared or peer-shared, and to self-directed strategic reading experiences (Lee & Schmitt, 2014), ultimately students can assume full responsibility for and control over expert-like competence with metacognition.

With the insights gained from a comprehensive set of literatures, in the next section the author will review the empirical research to identify how these practices are utilized or recognized in assessment studies of metacognition instruction.

Assessing Teachers' Pedagogies of Metacognition

A constructivist view of reading proposes that teacher is a mediator "who helps students construct understanding about: (a) the content of the text itself; (b) strategies that aid in interpreting the text; and (c) the nature of the reading process" (Dole et al., 1991, p.252). In consideration of this argument and discrepancies between mainstream and classroom realities, teachers are expected to deliver metacognition instruction to their students explicitly (Curwen et al., 2010), analytically, and adaptively (Duffy, 1993, 2002; Paris et al., 1986).

Although metacognition instruction is crucially important to support students' autonomous strategic reading competencies and although programs, approaches, techniques or methods could be identified for this purpose, it is important to recognize that a teacher's expertise in using any of these instructional practices or aids makes the difference (Duffy, 2002). Therefore, recommending teachers to implement metacognition instruction *skillfully, explicitly, analytically, and adaptively* might sound vague and might leave teachers helpless. For this reason, literature on assessing teachers' pedagogies of

metacognition will be reviewed in this section to scrutinize specifications with teaching metacognition. By this analysis, potentials to manifest teachers' instrumental role in students' metacognition development (Duffy, 1993; Fisher, 1998; Hartman, 2001; Jones, 2007; Papleontiou-louca, 2003) can be estimated.

Literature on assessing teachers' pedagogies of metacognition will be reviewed by the following criteria; the research is to explicitly state and clarify the criteria or codes for assessing teachers' pedagogies of metacognition. However, as the literature in this realm is limited, implicit understandings or codes of teaching metacognition, therefore, will have to be interpreted from the findings when necessary.

Standardized measurement instruments. Based on an extensive review of literature, Wilson and Bai (2010) concluded that limited research has been done to examine teachers' awareness and pedagogies of metacognition. In fact, they found that there was no measurement instrument designed to assess teachers' metacognitive knowledge and pedagogies of metacognition. Considering the beneficiary role of metacognition in students' success, they reasoned that studying teachers' understandings of teaching metacognition is important for its impacts on teachers' practices and students' learning. For this reason, Wilson and Bai (2010) examined teachers' pedagogical understanding of metacognition that refers to an "understanding of what is necessary for teaching of metacognition" (p.271).

Creating a measurement instrument based on three components of metacognitive knowledge and a pedagogical approach for metacognitive strategies, Wilson and Bai (2010) aimed to assess teachers' perception of their knowledge of metacognition, pedagogical understanding of metacognition, and beliefs about practices encouraging

students' metacognition. For this purpose, 105 graduate students who were K-12 teachers majoring in different areas in education were recruited.

The survey that Wilson and Bai (2010) developed included two parts. Part one contained demographic questions and two open-ended questions; What is metacognition? What are metacognitive thinking strategies? (p.274). These open-ended questions were asked to determine participants' declarative understanding of metacognition and metacognition in teaching, respectively. Part two included teachers' metacognition scale (TMS) and it was composed of 20 items. TMS was rated on a 4 point Likert-scale ranging from strongly agree (4) to strongly disagree (1). This part was designed to assess participants' self-perceptions regarding their understanding of metacognition and pedagogical knowledge of metacognition. In this section, participants were asked about "modeling/demonstration of thinking processes, opportunities for practicing thinking processes, students sharing thinking processes, questioning strategies, providing feedback/debriefing practices, grouping practices, and the use of active discussions" (Wilson & Bai, 2010, p. 274). TMS also included questions in order for participants to evaluate students' metacognitive processing. For this purpose, participants were asked to rate the level of students' metacognitive thinking described during hypothetical learning situations like planning a project or writing an essay. In this section, participants were also exposed to statements of teaching activities that participants believed to be beneficiary for students' metacognition.

Following item development, TMS was evaluated for its validity and reliability. For content and construct validity, expert examinations were ensured and confirmatory factor analysis was done, respectively. Wilson and Bai (2010) stated that according to

metacognition and pedagogical theory, four factors (declarative knowledge, conditional knowledge, procedural knowledge, and pedagogical knowledge) were identified and 20 items were loaded on them ($p>.05$). By their model, in total 61% of the variance was explained. In addition, Wilson and Bai (2010) calculated the internal subscale reliabilities. By calculating Cronbach's Alpha, all subscales were found to have an $\alpha >.70$. Besides, internal consistency of TMS was .75.

Limitations of TMS. Although Wilson and Bai (2010) developed the first standardized measurement instrument assessing teachers' knowledge and pedagogical understanding of metacognition, there were some limitations or concerns to be cognizant of. As Wilson and Bai (2010) stated, TMS assesses whether the "participants know what is right" (Wilson & Bai, 2010, p. 286). It does not assess what teachers, in general, do to educate metacognitive students.

Moreover, there were some concerns regarding the validity of the measurement instrument. Although Wilson and Bai (2010) claimed that it is intended for reading. Starting with two open-ended questions, TMS seems to be a more domain-general measurement instrument. Wilson and Bai (2010) for example, asked participants to define metacognition in general rather than asking them to explain how metacognition can manifest in reading. Considering participants diverse teaching majors, the answers they collected for this question reflects very broad responses like metacognition is thinking about thinking and knowing how to think about problem-solving. In general, these responses are well-said; however, they may not reflect reading specific characteristics of metacognition. In relation, when Wilson and Bai (2010) determined their four factors composing the survey, they defined each of them as in the following;

> • Pedagogical: participants' pedagogical understanding of metacognition included his/her understanding of what it means to teach students to integrate declarative and procedural knowledge in solving problems of learning
> • Conditional: participants' understanding regarding the conditions under which certain strategies are implemented
> • Declarative: participants' declarative knowledge of metacognition reflect an understanding of the definitions of metacognitive strategies or making students aware of metacognitive strategies
> • Procedural: participants providing assignments that require students to apply particular metacognitive strategies (p.278-279).

As can be seen by these definitions, these four factors generated domain general statements rather than anchoring metacognition in reading unlike they claimed. Moreover, because they did not define reading and specify the purpose of metacognition instruction in reading, the operations of metacognition instruction were not clear.

In addition to aforementioned limitations or concerns, participants were asked to evaluate students' metacognitive processing by rating hypothetical situations. They asked participants to rate whether students

> spent most of their time planning the logistics of their final presentation before fully developing their models…if they are able to describe how and why they plan to use each of the six simple machines to create a roller coaster…if they are aware of the reasoning involved in completing a Venn Diagram (Wilson & Bai, 2010, p. 282).

Similarly, participants were also asked to rate their beliefs considering for example "explain[ing] the mental processes use to answer inferential questions" (p.281) and students' metacognitive processing by "the level of metacognitive thinking if they are asked to complete an essay that describes the events of Sherman's March on Atlanta including the who, what, where, when, and why" (p.282). Although all these items might require manifestations of metacognitive strategies, teachers' pedagogical understandings of metacognition cannot be reduced to and simply represented by hypothetical and very specific contexts for example, six machines to create a roller coaster, Venn Diagrams,

answering inferential questions, or completing an essay describing Sherman's March on Atlanta. By these items, it is difficult to create a standardized valid measurement instrument to assess teachers' knowledge or pedagogical understanding of metacognition in reading and measure it proximately.

In addition to aforementioned limitations and concerns about validity of the instrument, concerns regarding data analysis and instrument development procedures cannot be ignored. First of all, although TMS was the first initiative of developing a standardized measurement instrument to assess teachers' pedagogies of metacognition, Wilson and Bai (2010) imposed a confirmatory factor analysis (CFA) on their items instead of running an explanatory factor analysis first. Without sufficient conceptualization and specification with the construct and without cognitive or focus group interviews for the comprehensibility of the items, collecting data and imposing CFA on the data might be misleading. Moreover, for confirmatory factor analysis that provides adequate statistical power, a minimum of 200 participants is recommended (Hoelter,1983 as cited in Hinkin, 1995). However, Wilson and Bai (2010) run their CFA with a smaller sample size of 105, their loadings, therefore, might have been impacted by the small sample size.

Finally, to measure pedagogical understandings of metacognition using a 4 point Likert scale ranging from *strongly agree* to *strongly disagree* might be problematic. Not only is the range itself limited but more importantly the agreement scale may not be appropriate to assess cognitions. Although Wilson and Bai (2010) claimed that they assessed whether participants know what is right, they might in fact have assessed participants' tendencies towards teaching metacognition. By looking at the first four

items, it can be said that a Likert scale of agreement cannot assess teachers' pedagogical understandings of metacognition, at all. For example, one of these items is that "You are evaluating students' metacognitive processing. Rate the level of metacognitive thinking if they are aware of the reasoning involved in completing a Venn Diagram" and by simply its structure, it is impossible to rate it on an agreement scale. Therefore, both internal consistency and subscale reliabilities might be impacted by this limitation and the validity of the overall scale can be jeopardized to a great extent.

TMS is the only standardized measurement instrument assessing teacher's pedagogies of metacognition in the present time. However, as mentioned, it poses serious concerns regarding validity, reliability, factor analysis and loadings, and its structural properties. For this reason and to confirm the developing understanding of teaching metacognition, qualitative research studies will also be reviewed as in the following section.

Qualitative research studies. The earliest research examining teachers' pedagogies of metacognition interestingly dates to 1990s although metacognition theory literally emerged in the 1980s. In this section, qualitative research studies assessing teachers' pedagogies of metacognition will be reviewed for the definition of teaching metacognition or metacognition instruction and for their assessment criteria capturing teaching metacognition.

Defining the construct of teaching metacognition. To start with the definition of metacognition instruction or teaching metacognition, it was found that from the previous literature referred in the first problem section, 8 of them defined metacognition instruction or teaching metacognition directly. That is, readers can find an explicit

definition of the phenomenon within the report. On the other hand, in 2 studies an understanding of metacognition instruction can be drawn for example, by the review of literature, research hypothesis, or questions, or data analysis procedures. In general, these studies defined metacognition instruction as fostering students' reflective thinking; higher order thinking; or strategic thinking, or regulation of one's learning (emphasizing metacognition exercise). Only five studies (Fisher, 2002; Kerndl & Aberšek, 2012; Ozturk, 2016; Perry et al., 2008; Thomas & Barksdale-ladd, 2000) regarded teachers and defined metacognition instruction as teachers' utilization of their metacognition and embedding it into instruction for students to develop metacognition.

Although metacognition instruction was defined broadly yet with sufficient consistency, it is important to identify the criteria for which teachers' pedagogies have been assessed to understand how classroom metacognition instruction was interpreted and captured.

Assessment criteria. In this section, ten available research studies on assessing teachers' pedagogies of metacognition will be reviewed for their assessment criteria of teaching metacognition. The earliest study assessing teachers' pedagogies of metacognition was conducted by Kurtz et al. (1990). In this study, teachers' efficacy in developing students' metacognition assessed by a self-report measure that included Likert scale items, open-ended short response items, and true/false items. In total, there were seven items inquiring classroom metacognition instruction. However, when these items are closely studied, only three of them could be utilized to evaluate teachers' practices of metacognition instruction. These included teaching students different learning techniques

appropriate for different learning tasks, giving specific instruction in the use of learning strategies, and informing students about benefits of strategies in being strategic.

Another earlier study assessing teachers' pedagogies of metacognition was conducted by Duffy (1993). Duffy (1993) analyzed lesson-transcripts, interviewed students, and observed classes to find out whether teachers explain why students were learning strategies and how these strategies could help them become strategic readers sufficiently, model strategic reasoning, influence students' ability to reason for comprehension building, and provide feedback for students' thinking.

Another study that examined teachers' knowledge and practices of metacognition was done by Zohar (1999). Using a grounded approach for her data analysis, Zohar (1999) did not state what codes were and did not specify what they stand for. With the concern of limited extant literature, the findings were analyzed to identify the codes in this study. Findings focused on teachers' explicit teaching of thinking skills, engaging students in metacognitive discussions of thinking, and modeling thinking and reasoning during problem solving.

In addition to these studies, Thomas and Barksdale-ladd (2000) did a study and examined pre-service teachers' metacognitive awareness that they bring to reading instruction. For this purpose, the researchers analyzed student-teachers' reflective journals of tutoring a young reader, and student teachers' reflections on instructional approaches with regards to a case where an imaginary young child has comprehension problems. This data set was examined by the following criteria; strategic monitoring activities, isolated, out of context activities, generative activities, demonstration/modeling activities, reflective exercises, and oral reading activities. For the purpose of this paper,

only criteria relating to metacognition instruction were disseminated as in the following. These include demonstrating or modeling activities where student-teachers are to read aloud to model a reading processes. This category also included children's reading and thinking aloud following teachers' modeling. Reflective exercises pertain to asking children to reflect on what they read.

Examining secondary education teachers' practices of developing self-regulated learning in Deutschland, Bolhuis and Voeten (2001) did an observation study and used data analysis codes as in the following; explaining, questioning, students' turn, giving feedback, coaching or supervising, procedural matters and task instruction to examine the data. These categories were disseminated specifically for metacognition instruction. For explaining, a teacher explains and demonstrates how to learn and monitor learning. For the second category, the teacher asks questions to learn about learning activities that students have planned. Besides, the teacher asks about the importance of subject matter and initiate student-discussion on the relevance of the subject matter. Students' turn relates to teacher's listening to students or observing their learning, for example, skills. Teacher asks questions and waits for the students to engage in problem solving. Furthermore, giving feedback pertains to teacher's responding to a student's learning related actions or statements. Teacher's reactions might be short like "yes" or "no" without further explanations or she might repeat what student said to summarize and rectify the content. Teacher can also make positive comments on learning activities or efforts. Finally, task instruction pertains to explaining what the students are expected to do for task-completion in relation to learning goals. Teacher explains the significance of the subject matter and learning goals outside the school context and how to approach the

task. The teacher makes sure that students understand how to monitor and evaluate learning, how to manage task completion difficulties, and how to present tasks so that they can attain the authentic tasks.

In her observation study, Fisher (2002) focused on the implementation of metacognition instruction and examined whether teachers model thinking while they engage in a cognitive act (i.e. reading). That is, teachers' making thinking skills explicit by thinking aloud and showing students how to achieve a goal rather than what to achieve was used as the criteria to assess teachers' pedagogies.

Perry et al. (2008) also studied metacognition instruction with regards to teachers' instrumental role in students' metacognition. They aimed to capture teaching metacognition by coding teachers' "providing students with opportunities to make choices, control challenge, and engage in self-evaluation" (p.102), modeling, using explicit language, asking students prompting questions to think about their cognitive engagements, and teachers' or peers' scaffolding or reinforcing learning.

Analyzing classroom observations of teacher practices and interviews during professional development period through a lens of grounded theory, Curwen et al. (2010) studied their data by three major themes; metacognition and reflection, creation/ exploration of content domains, and integrated literacy and content instruction. For the scope of this paper and goal of this research, metacognition and reflection codes and in relation findings are elaborated. Considering teachers` instrumental role in developing students' metacognition, Curwen et al. (2010) recognized some instructional patterns developing students' metacognition. These included teachers' explicit comprehension instruction, students' practice and use of comprehension strategies, students' reflections

and new ways of thinking, and increased student responsibility and ownership of learning. However, to help students develop metacognition, teachers were basically asked to implement practices of activating background knowledge, think-alouds, using graphic organizers, analyzing text structure, justifying graphic structures, using contextual vocabulary clues to make meaning, reflecting on writing prompts and content ideas, synthesizing knowledge, and enabling group work.

Kerndl and Aberšek (2012) did a study to examine teachers' competence for developing students' metacognition. Although data analysis codes were not laid explicitly, the findings clustered around helping students discover their own interest, strengths, and weaknesses and thinking about their own cognitive engagement. That is, teachers were assessed for teaching students to be aware of their thoughts and cognitive strategies for and during a cognitive act, monitor their processes, and evaluate their cognitive engagement and products.

Finally, the author also (i.e. Ozturk, 2016) examined pre-service teachers' knowledge of metacognition and teaching metacognition. Interviewing with pre-service teachers and observing their reading methods class, the author used the following codes to analyze the data; teachers' modeling or thinking aloud strategic reading, informed-strategies teaching *(WWW&H rule),* scaffolding students' strategic reading, and self-assessment. However, like previous studies, the author could handle limited set of criteria representing metacognition instruction.

Limitations of qualitative research studies. Limited in number and scope, this set of research needs to be approached carefully. Similar to the concerns regarding Wilson and Bai's (2010) TMS, qualitative research studies also arouse some concerns regarding

the validity and reliability of the analysis. Although some might argue that qualitative research basically ensures trustworthiness, still "reliability and validity can be applied to all research…[and they] act as a self-correcting mechanism to ensure the quality of the project" (Morse, Barrett, Mayan, Olson, & Spiers, 2002, p.14). For this reason, in the following some concerns regarding validity and reliability will be presented.

Aforementioned qualitative studies broadly and mostly consistently defined metacognition instruction as portrayed. However, teaching metacognition was not specified sufficiently and observable measures were not clarified. Without a pedagogical framework, each and every single study touched upon some aspects of teaching metacognition. Moreover, these criteria were not studied in relation to students` metacognition examined for example, by think-aloud or represented by reading performance scores. For these reasons, validity of the assessment is a concern.

Moreover, reliability of the inferences can also be problematic. Using codes to sort and interpret data, aforementioned studies did not communicate whether and how interrater reliability was ensured except two studies (i.e. Kurtz et al.,1990; Ozturk, 2016). As Pope, Ziebland, and Mays, (2007) emphasized the importance of interrater reliability for the soundness of findings, there was no sufficient explanation for any action taken to control or prevent researcher's subjective judgments or biases in almost all studies reviewed in this section. If there was a sound literature-informed pedagogical framework and if the specification of teaching metacognition was confirmed, a lack of inter-rater reliability might be tolerated.

In addition, this set of research also arouse some practical concerns regarding the approximation of teaching metacognition practices especially for observation studies.

Examining the phenomenon partially, researchers could observe teachers' practices for a short period of time. However, most of the time, such small instances of teaching can be appetizers for researchers; they may help estimate teaching patterns, but cannot approximate teaching performance.

Summary of assessing teachers' pedagogies of metacognition. The review of literature on assessing teachers' pedagogies of metacognition helped identify that metacognition instruction was defined broadly yet with sufficient consistency; however, teaching metacognition was not specified well. Therefore, teachers' pedagogical practices of metacognition were examined divergently and inconsistently as can be seen in Appendix A. This review section remarkably confirmed there is a need for a pedagogy of metacognition. In relation, there is a need for a standardized measurement instrument to interpret teaching metacognition in classrooms. So that, the effectiveness of instructional practices can be examined in relation to learning outcomes in very near future.

Despite a lack of pedagogical understanding, assessed instructional practices of metacognition aligned with the gradual release of responsibility framework and these included;

- ✓ helping students discover their reader characteristics including, interests, strengths, and weaknesses
- ✓ teaching strategies directly or explicitly
- ✓ providing students with informed training
- ✓ modeling or thinking aloud a cognitive act
- ✓ listening to students' plans for or approaches to a task
- ✓ providing students with opportunities to make choices

- ✓ providing students with different tasks
- ✓ providing students with opportunities to control challenge
- ✓ having student reflect on their cognitive engagements
- ✓ having students think aloud their cognitive engagements
- ✓ providing students with scaffolding
- ✓ giving feedback on students' practices of cognitive engagements
- ✓ initiating students' metacognitive discussions
- ✓ encouraging students' group practices of metacognitive strategies
- ✓ assessing students' understanding of metacognitive strategies
- ✓ providing students with opportunities to do self-assessment

It should be noted that the author intentionally brought diverse criteria of metacognition instruction assessment practices together in the previous list to inform a pedagogy of metacognition and help with the specification of teaching metacognition in the following section.

Emerging Patterns: What does Empirical Research Bear for Metacognition Instruction?

In the previous sections, both theoretical and empirical literature in the domain of reading was reviewed to identify instructional practices for students' metacognition. Following a systematic categorization of empirical research (see Appendix F), it was identified that research utilized the following practices either to assess or to implement metacognition instruction; informed or explicit training of strategies, teachers' modeling or thinking aloud strategic reading, students' demonstration or thinking aloud strategic reading, using instructional aids, cooperative practices with students or scaffolding

students' strategic reading practices, metacognitive discussions, and metacognition assessment. However, assessment (teachers' and students' self-assessment) practices were not as highly suggested for or used to identify metacognition instruction as others. By the nature of other instructional practices, such as metacognition discussions (the second-least utilized practice or criteria for metacognition instruction), cooperative practices, or students' thinking aloud or demonstration of strategic reading, it may be possible for some teachers to recognize students' metacognitive knowledge or capability. Similarly, some students might engage in self-questioning and reflect on their decisions while they are for example, thinking aloud or discussing their strategic reading experiences with peers. However, these possibilities are limited to students' personal characteristics or teachers' expertise and instructional objectives. Even if these practices might help stakeholders to get an idea about students' current capabilities, they may not always identify students' needs regarding metacognition. Therefore, considering the reciprocal relation between assessment and instruction, such practices may not always substitute assessment's informative nature for its instruction. Indeed, assessment practices are descriptive and goal-directed; thus, they help both develop goals to be achieved and inform roadmaps for these goals.

At this point, mostly suggested instructional practices for metacognition or criteria to assess pedagogies of metacognition can be identified. Limited research, however, does not explain why assessment practices are not adopted or suggested as frequently. As Lai (2011) stated, it may be because metacognition is not traditionally and regularly assessed at schools. Or else, as Afflerbach and Meuwissen (2005) stated self-assessment is a collection of metacognition capabilities that operate at the edge of

consciousness. It may be the final stage where individuals utilize their metacognitive operations independently, flexibly, and smoothly.

Following the review of literatures that helped to identify metacognitive readers' characteristics and competencies along with metacognition instruction practices, the author will delineate her understanding (a pedagogy of metacognition) in the following section. For this purpose, metacognition literature will be soaked in the social realm of learning and dimensions of a pedagogy of metacognition will be described from a teacher's perspective. So that, specification with teaching metacognition can be ensured.

Research Question 1: What Does A Pedagogy of Metacognition in Reading Entail?

"Almost anyone who can perform a skill is capable of metacognition"

(Schraw, 2001, p. 14)

The critical role of metacognition in reading has been examined and emphasized thoroughly. For its beneficiary impacts, many researchers including Griffith and Ruan (2005) highlighted that "metacognitive instruction should be a much-valued component in literacy instruction" (p. 12). For this purpose, since early 1980s, many programs, approaches, methods, procedures, or techniques have been studied for their impacts on students' metacognition and performance indicators. However, as stated by De Corte (2000), research practices most of the time cannot represent a holistic approach to classroom instruction and there is a lack of connection between research and classroom practices (Baker, 2017). Therefore, a pedagogy of metacognition aims to communicate research goals, approaches, and outcomes in a format that metacognition instruction "become accessible, palatable, and usable for the teachers" (De Corte, 2000, p.255).

Regarding metacognition instruction, Duffy (2002) recommends empowering teachers who think for themselves and for their students rather than favoring one program, approach, technique or method. As Duffy (2002) stated, teachers' professional decision and their instructional implementation makes the difference in students' learning, but not the method or technique, itself. For this purpose, instead of creating in teachers' minds that success lies outside themselves (Duffy, 2002), a pedagogy of metacognition aims to help teachers create active and reflective reading experiences where meaning is constructed as a product of individuals' metacognition to perform task demands. Moreover, because classroom instruction is always autonomous and spontaneous, a pedagogy of metacognition does not impose any scripted or established programs, techniques, or methods but utilizes them flexibly. By appreciating students' unique developmental characteristics and strengths, recognizing extant competencies and capabilities, and assessing their extant adequacy and needs, teachers had better continually adjust and adapt ongoing metacognition instruction.

Following a systematic and analytic review of extensive literature, the author concluded that a pedagogy of metacognition in reading can be implemented by the following dimensions: fostering students' metacognitive knowledge, adopting goal-directedness, integrating language of thinking, scaffolding students' strategic reading, encouraging students' independence with strategic reading, assessing metacognition, and prolonging metacognition training. In the following, each dimension will be disseminated.

Fostering students' metacognitive knowledge. According to Book, Duffy, Roehler, Meloth, and Vavrus (1985), metacognitive awareness pertains to "how to think

about the reading process." (p. 29). Although this is such a short definition, it is very dense. It implies that reading is impacted by a knowledge repertoire about reading, thinking, and self. Regarding reading, students need to recognize that reading is not simply running the eyes over the page. As many researchers including Book et al. (1985) emphasized, reading is a purposeful act of meaning making by various resources, perceptual processes, and thinking.

In relation to the previous definition of reading and as Pressley (2002) highlighted, thinking is a precursor for successful reading. As McDevitt and Ormrod (2016) stated, students need to recognize that they "can learn and achieve through effort and technique rather than assume that their level of performance is predetermined by existing abilities" (p.266). For this reason, students are to develop an understanding of metacognitive and cognitive strategies as potential means for thinking about the text. That is, students should be aware of what strategies are, how they support reading comprehension, and when and why they can be applied (Cantrell Chambers et al., 2017; Paris & Flukes, 2005; Veenman et al., 2006). Therefore, readers can overcome reading difficulties, ensure comprehension, and meet task requirements.

Lastly, knowledge about the self is another component of metacognitive knowledge (Cubukcu, 2008; Fisher, 1998; Flavell, 1979). Knowledge about the self pertains to one's perceptions and judgments of how one knows, thinks, and reads under certain conditions. As Fisher (1998) emphasized, one's awareness of himself is important for reading. Individuals can manipulate reading appropriately when they "have a clearer grasp of what they know and what they do not know, they know what they can do and they cannot do, and they know what will help them gain the knowledge or understanding

they need" (Fisher, 1998, p.8). As the understanding of knowledge about the self relates to *conditions*, individuals' perception and judgments of self- as a reader- can be influenced by task-demands and text properties. Knowledge about reading, therefore, can also relate to knowledge about various text genres, structures, topics, and task demands. By evaluating the text's properties in relation to task demands, individuals can understand how successfully they can make sense of the text and achieve reading-goals.

To help students build a repertoire of metacognitive knowledge in the domain of reading, teachers can implement explicit teaching, model strategic reading, and hold metacognitive discussions.

Fostering students' metacognitive knowledge by explicit teaching. Students' knowledge about strategic reading can be increased by explicit teaching. For this purpose, teachers initially need to inform students about the nature of reading and necessity of thinking about the text for meaning construction. Then, teachers should teach students how to evaluate task, text, and select strategies explicitly. In addition, teachers should explain the usefulness of strategies to reading comprehension (Book et al., 1985; Dole et al., 1991; Duffy, 2002; Gourgey, 1998; Palincsar, 1986; Pressley et al., 1992; Veenman, 2013b; Veenman et al., 2006). As Book et al. (1985) and Veenman et al. (2006) suggested, teacher should also teach students When, Where, and How to use strategies explicitly.

Moreover, teachers need to explain the reciprocal flow between metacognitive and cognitive strategies. Considering Nelson's (1996) model where meta-level operations control object-level and where object-level operations inform meta-level, teachers must inform students that for reading simply employing cognitive strategies might not be

sufficient. To illustrate, activating prior knowledge is a cognitive strategy and it is important to plan reading and monitor comprehension as Palinscar and Brown (1984) stated. However, unless a reader is aware of when, why, and how to use prior knowledge activation strategy, s/he might not know that planning reading is important to control meaning making, and activating prior knowledge can help him set a reading goal and make some predictions to direct his efforts. For this reason, it is important to dissolve cognitive strategies into metacognitive strategies. That is, a teacher should teach students when, how, and why one needs to plan his reading; how and why one can monitor comprehension; how, why, and when one can regulate cognitive strategies; and when, how, and why one can evaluate both the reading process and products (Duke & Pearson, 2008; Veenman et al., 2006). To support teachers' explicit teaching of strategies, graphic organizers or charts can be used (see Appendix E). Therefore, students can better develop relational visuals of the two-way information flow between cognition and metacognition (Israel, 2007).

Teachers also need to explain individualized approaches to reading. That is, as Joseph (2006) pointed out, each and every individual develops a unique approach to build comprehension. While teachers inform students about the beneficiary impacts of thinking about the text; recognizing text properties, analyzing task demands, utilizing metacognitive knowledge about strategies, and knowledge about the self together for strategic reading (Hartman, 2001a), students should know that "personalization and modification of strategies is a natural part of meeting particular needs and preferences" (Pressley et al.,1992, p.10). Therefore, students know that their reading experience might

differ from the teacher's, other students', and even from their earlier previous reading experiences.

Fostering students' metacognitive knowledge by modeling. As Duffy (1993) stated, teachers can help students understand that each and every individual can be in control of his reading. For this purpose, teachers need to make both thinking through reading and metacognitive control over reading visible. In addition to clarifying mental steps to comprehension building (Book et al., 1985; Joseph, 2006), teachers need to show the impacts of one's thinking about the text on reading comprehension or reading-goal achievement (Book et al., 1985; Duffy, 1993; Duke & Pearson, 2008; Pintrich, 2002;Veenman et al., 2006; Veenman, 2013b).

To demonstrate authentic strategic reading experiences where cognitive and metacognitive strategies interact and where such an interaction creates a beneficiary impact on goal achievement, task performance, or reading comprehension (Duffy, 1993; Duke & Pearson, 2008), teachers can utilize think-aloud technique and graphic organizers. Think-aloud helps a teacher verbalize metal work of comprehension building and make her reasoning visible (Hartman, 2001a; Israel, 2007). By thinking aloud, a teacher communicates how she plans, monitors, regulates, and evaluates her reading. She explains the rationale for all steps taken towards comprehension and discusses the benefits of each step on her approach to comprehension, task completion, or goal-achievement; the benefits of thinking about the text. While thinking strategic reading aloud, a teacher can benefit from self-questioning and self-directive statements. For example, she might ask herself "What is my purpose of reading a text on social justice?" to set a goal for her reading and to monitor her comprehension, she might instruct herself

by saying “Ok, I should take notes and then synthesize main ideas presented in each paragraph” to achieve a global understanding of social justice. These examples of self-questioning and self-directive statements can help students see teacher’s lines of thinking.

Teachers can also use graphic organizers to model strategic reading as suggested by many researchers including Schraw (2001), Hartman (2001a), and Israel (2007). On a visual chart, teachers can help students walk through different levels of thinking about the text and show them different components of thinking. By filling organizational charts (see an example in Appendix E) with the teacher, students can understand how metacognitive strategies call the execution of cognitive strategies and how for example, analyzing task demands or personal motivations necessitate execution of metacognitive strategies.

The purpose of modeling is, however, not to have students replicate teacher’s strategic reading in verbatim. The purpose of modeling is to provide students with sufficient coaching and scaffolding. For this reason, the teacher should also point out possible problems with comprehension, strategy use, task-evaluation, or thinking that students might experience (Kolencik & Hillwig, 2011). Then, she should show how to deal with such problems. That is, modeling strategic reading is not simply verbalizing a flawless reading activity, but it pertains to approximating readers’ struggles or problems with comprehension and showing that despite difficulties, one can comprehend a text and achieve related goals.

Fostering students’ metacognitive knowledge by metacognitive discussions. A pedagogy of metacognition suggests that teachers has better adapt instruction to students’ needs. For this purpose, as McDevitt and Ormrod (2016) emphasized, students need to

describe their mind. In order for students to describe their thinking about the text (McDevitt & Ormrod, 2016) and for teachers to "identify inconsistencies and gaps in their [students'] understanding of concepts" (Carr, 2010 as cited in McDevitt & Ormrod, 2016, p.265), metacognitive discussions can be held. By having students reflect on their thinking about the text, a teacher can help students to recognize their own strengths and weaknesses regarding strategic reading and appreciate the benefits of thinking about the text on strategy choice, comprehension, and task performance.

Adopting goal-directedness. Goal-directedness pertains to goal-directed reading, strategy use, and strategy learning. To start with goal-directed reading, it is important for teachers who aim to develop students' metacognition in reading initially "place a priority on developing students' understanding of why reading is important" (Duffy, 1993, p. 233). In relation, teachers also need to clarify the purpose of reading and discuss potential reasons to read. The purpose of reading is typically considered comprehension; however, in consideration of text properties, task demands (Book et al., 1985), contextual dynamics, and personal orientations, the purpose of reading may vary. Moreover, in addition to explaining the functions and necessity of goal-setting for reading (Israel, 2007), it is important to give a voice to students' personal goals and expectations (Zimmerman, 2002). By encouraging students to question and communicate why they should or want to read the text, teachers can foster students' autonomy and goal-directed reading experiences (Baker & Brown, 1984a, 1984b; Duffy, 2002; Israel, 2007; Palinscar & Brown, 1984). That is because students "are more likely to think critically about reading something that has a purpose in their lives as opposed to simply being told, 'Read this" (Israel, 2007, p.32). When students do self-questioning regarding their purposes,

they have something to think about and value. This is when metacognitive thinking occurs (Israel, 2007).

Teachers also need to explain the virtue of goal-directed strategy use. This aspect, indeed, is directly related to goal-directed reading because once individuals set their reading goals, they plan their reading accordingly. When they know why they are reading, they can choose appropriate strategies, monitor whether they are successfully reaching their goal, regulate their efforts to fix comprehension failures, if there are any at all, and then they can evaluate their comprehension and approaches to goal-fulfilment. This is, reading approaches can change in relation to reading purposes (Palinscar & Brown, 1984; Samuels et al., 2005). Individuals might read for example, to get ready for an exam, to prepare a homeopathic medicine, to learn about chakras, to travel in a new city, or to write an essay reflecting a synthesis of different perspectives. However, each of aforementioned reading experiences will be handled differently.

Similarly, it is also important to clarify the rationale for learning strategies. As Paris, Wixson, and Palincsar (1986) emphasized, students need to find instructional activities and learning meaningful; therefore, they can master and internalize knowledge. Understanding the value of strategies can help students develop a personal rationale for learning them and can facilitate continuous use (Paris et al., 1986). A common rationale for learning strategies can be improved academic performance and achievement by reading strategically. However, teachers need to encourage students to think about why they want and need to learn strategies to boost students' autonomy. Therefore, building a set of strategies becomes self-controlled and purposeful.

Establishing a purpose for reading, strategy use, and strategy learning can help with students' metacognitive control over reading. By goal-directedness, students' approaches to reading can become self-motivated, self-determined, and resilient.

Integrating language of thinking. As emphasized in Vygotsky's (1978) social constructivist theory, students adopt the habits and tools of thinking of the social groups that they interact with. For this reason, many researchers including Fisher (2007), Israel (2007), Schraw (2001), and Tishman and Perkins (1997) emphasized language of thinking. Therefore, it had better be a component of metacognition instruction. While explicitly teaching, modeling, and directing metacognitive discussions in the classroom, teachers had better use an advanced set of vocabulary for talking about thinking (Fisher, 2007). Therefore, students can develop sensitivity to and dispositions of thinking and reasoning.

In addition to teachers' use of language of thinking, students had better utilize it not only for thinking and reasoning but also to make their thinking public easily (Tishman & Perkins, 1997). Especially when teachers share strategic reading responsibility with students, when students engage in metacognitive discussions with the teacher or other students, and when students are asked to make their thinking about the text public, language of thinking should be used. That is, students should be required to show *evidence*, *justification*, and *reason* for their thinking *processes*, *assumptions*, and *hypotheses*. Students are to challenge themselves and peers' *theory and conclusions*; therefore, students can gain the habits of thinking. As Duffy (1993) stated, when students are invited to articulate their thinking about the text and in relation, strategy utilization, they become aware of adaptive use of the strategies. By questions using a language of

thinking, students not only facilitate and organize their thinking but also "internalize the principles they verbalize and make them an integral part of their own cognition" (Papleontiou-louca, 2003, p.24).

Scaffolding students' strategic reading. Aforementioned teacher-directed instructional practices can help with students' metacognitive knowledge. However, students need to practice their metacognitive knowledge and get feedback for their metacognitive experiences (Borkowski & Muthukrishna, 1992). Therefore, they gradually gain independence with and control over cognitions. For this purpose, teachers can share strategic reading responsibility with students and students' strategic reading practices can be initiated, examined, and scaffolded with different instructional aids like worksheets (Book et al., 1985), instructional techniques like think-aloud, or interpersonal practices with other community members like peers (Duffy, 2002).

Sharing strategic reading responsibilities with students. Teacher's explicit instruction and modeling strategic reading can precede sharing reading experience with students (Book et al., 1985; Duke & Pearson, 2008; Papleontiou-louca, 2003). To help students develop competencies for and adequacy with strategic reading, students should be scaffolded by an interactive dialogue (Hartman, 2001a). That is, while a teacher demonstrates her thinking about the text and strategy use, students can attend what the teacher says, think along with her, examine the accuracy of her mental process, ask questions to clarify their understanding of teacher's task processing, react to difficulties and comprehension failures, and keep teacher's thinking aloud dynamic by their comments (Hartman, 2001a).

After teachers model expert reading, they can work with students and contribute to students' goal setting, identifying task demands, determining some strategies, comprehension monitoring, identifying when and why comprehension fails, spotting inconsistencies in comprehension building, suggesting strategies to improve comprehension, and evaluating reading comprehension, goal-achievement, and strategy utilization (Perry, VandeKamp, Mercer, & Nordby, 2002).

Providing students with instructional aids for strategic reading. To support students metacognitive experiences of reading, instructional aids including metaphors or analogies, graphic organizers of self-questioning, thinking maps, strategic reading action plans, or rubric worksheets can be used (Kolencik & Hillwig, 2011). Such aids can include probing questions, directions, or reminders to help students visualize, organize, and practice strategic reading. Accompanied with a grade-appropriate reading text, a visual like in the following (see Figure 4) can help stimulate students' thinking about the text.

To illustrate, a student can utilize the thought organizer provided in Figure 4 to manage his reading and to monitor his thinking about the text for successful comprehension or task performance. Checking whether he is able to activate his prior knowledge about for example, planets; he may recognize that he cannot reach his prior knowledge. In fact, he may recognize something new about himself; he is not interested in planets and he does not know much about them. Thinking about himself as a reader, reading tools, and task demands, the child may think how he can read the text better as it may not flow for him. Therefore, he can decide to slow down and take notes to comprehend new information better and to meet task demands.

In this scenario, a young reader, who is in metacognitive control of reading, can regulate his strategy-use to ameliorate his weaknesses. He can also test the impacts of his decisions over his comprehension. For example, he can test how slowing reading down and note-taking helps him while he is reading unfamiliar topics. His assessment of task performance, for example building a model of solar system, can inform him about the effectiveness of his decisions he made so far. By this experience, he will develop an awareness of strategic reading and experience planning, regulating, and evaluating reading appropriately.

What do I know about the topic?	…… …… ……
What am I predicting to read by looking at the title and pictures?	…… …… ……
Why am I thinking so?	…… …… ……
Why do I want/ need to read this text? What is my goal?	…… …… ……
How will reading this text help me with my reading goal?	…… …… ……
What are my tools to make meaning?	…… …… ……
When do I change my tools?	…… …… ……
How well did my tools help me to understand the text?	…… …… ……
How well did my reading help me achieve my goal?	…… …… ……
How well did I complete the task?	…… …… ……

Figure 4. A taught organizer

However, it is important for students to transfer knowledge and skills for future independent performances (Hartman, 2001a). For this reason, students need to be constantly reminded that each and every reading act is unique and each and every reading act can stimulate different goals and in relation, require different strategies. Therefore, students should be reminded not to take such prompt as rules carved on the stone, but just aids to stimulate, control, and get instant feedback on one's thinking about the text.

Encouraging students to demonstrate strategic reading. Following teachers' explicit teaching, modeling, and sharing strategic reading responsibility with students, students should be assessed and scaffolded for their metacognition adequacy. For these purpose, students can be required to think-aloud. When students think aloud strategic reading, teachers can examine students' extant levels of metacognitive knowledge and performances with regulatory strategies. For this purpose, the teacher can question students' decisions for example, how students make sure they understand the text, why some of the information is rejected while some is settled on, and how and why strategies are adopted or regulated. Meanwhile, students can be provided with guidance to think about the text properties, task demands, and strategy utilization, if necessary at all. The teacher and students can also discuss what students found difficult, confusing, and why it is so (Book et al., 1985). Instead of estimating students' metacognitive characteristics and capabilities, teachers can recognize students' needs and strengths with references to reality. Following these assessment practices, teachers can provide appropriate scaffolding to help students gradually assume full responsibility for strategic reading.

Promoting students' collaborative practices of strategic reading and metacognitive discussions. Following guided-practices of strategic reading, students had better assume responsibility for independent strategic reading. However, this might be an unrealistic expectation for all students, since some might not show sufficient metacognition competency or adequacy to practice strategic reading on their own. For this reason, teachers can benefit from collaborative learning, as Pressley and colleagues (1992) and Klingner and Vaughn (1998) did. That is, students can be provided with opportunities to work with peers or in small groups so as to plan reading, monitor comprehension, regulate strategies to ameliorate comprehension, and evaluate their comprehension and task performances.

To scaffold students' strategic reading practices, students can also be provided with metacognitive discussion opportunities (Hartman, 2001a). Metacognitive discussions pertain to practices where students question each other's thinking about the text. Practicing strategic reading with peers and articulating their thinking about the text (Book et al., 1985) in risk-free environments, students can gain habits of thinking, listening to each other, appreciating different views, and building on one another's ideas through reasoning (Jones, 2007).

Encouraging students' independence with strategic reading. Following previous steps, students need to practice strategic reading independently (Duke & Pearson, 2008; Palincsar, 1986) in the pursuit of authentic tasks (Duffy, 1993; Ewijk, Dickhäuser, & Büttner, 2013). At this stage, students plan reading, monitor comprehension and manage comprehension failures by determining appropriate strategies, evaluate goal-attainment, task performance, comprehension, and strategy use

on their own. They can reflect on personal weaknesses, strengths, and reasons of reading difficulties. They also can reflect on the impacts of thinking about the text. Therefore, students can build accurate conceptions of metacognition as they assume total responsibility for thinking and reasoning (Papleontiou-louca, 2003; Pearson & Dole, 1987).

Although at this stage all reading responsibility is assumed by the student, it is important for teachers to be cognizant of any potential difficulties that the student may encounter and; therefore, be ready to provide scaffolding, if necessary at all. Helping students explore the consequences of their decisions and choices (Papleontiou-louca, 2003), teachers can examine and discuss students' viewpoints, strategy choices, comprehension failures, or ineffective goal attainment. Therefore, teachers can help students consolidate the acquisition of metacognitive knowledge and scaffold their metacognitive regulation by providing constructive feedback on students' independent experiences of strategic reading.

Assessing metacognition. Another important facet to support students' metacognitive development is assessment. Assessing metacognition has two facets; (a) teacher's assessment of students' knowledge about and regulation of reading besides self-perceptions of strategic reading and (b) students' self-assessment of strategic reading and reader characteristics.

Teachers' assessment of students' metacognition. As Duffy (2002) highlighted, teachers need to assess students' strategic reading. For this purpose, metacognitive discussions and think-aloud technique can be utilized. When the teacher and students discuss strategic reading as a part of classroom discourse, the teacher can judge the level

and depth of students' metacognitive knowledge (Pintrich, 2002). Moreover, teachers can also use think-aloud to obtain information about students' adequacy with strategic reading (Pressley & Afflerbach, 1995). For this purpose, think-aloud can be used concurrently or retrospectively.

Concurrent think-aloud pertains to students' verbalizing thought processes without any prompts and interruption during reading. Concurrent reports are important to reach the most accurate thoughts or strategic reading acts initiated within the course of reading. On the other hand, retrospective reports are gathered immediately after a reading act. For this purpose, students verbalize what they thought, when they experienced comprehension failures, and how they handled them. Retrospective think aloud assessments are important to understand students' rationale for strategic reading.

In addition to assessing metacognitive knowledge and regulation, it is important for teachers to meet students individually and discuss their perceptions and understandings of themselves as readers (Pintrich, 2002). This is because especially negative self-perceptions might interfere with metacognitive knowledge and impact proficient metacognitive regulation. By empathetic and dialogic conversations, teachers need to help students identify their own strengths and weaknesses with regards to strategic reading and help students improve their self-perceptions by providing them with opportunities to experience success.

In addition to aforementioned techniques, more formal surveys or interview procedures can be used to assess students' metacognition (Pintrich, 2002). Examples of such measurement instruments can be found within this study as reviewed earlier. In consideration of the reciprocal relation between assessment and instruction, assessment

procedures and measures can support students' development. While teachers can inform their instruction by confirming or disconfirming students' knowledge and capabilities of strategic reading (Israel, 2007), students can become more conscious and cognizant of their competencies with strategic reading.

Teachers' assessment is an indispensable pillar of a pedagogy of metacognition. However, metacognition instruction is to be orchestrated to educate independent and self-regulated learners. For this reason, students must also be handed the responsibility of doing self-assessment (Gourgey, 2001).

Promoting students' self-assessment. According to Afflerbach and Meuwissen (2005), "[s]elf-assessment is a collection of metacognitive knowledge, strategies, and mind-sets" (p.141-142) that "…operate at the edge of consciousness" (Afflerbach & Meuwissen, 2005, p.144). However, because "many students lack self-assessment ability" (Afflerbach & Meuwissen, 2005, p. 142), such mind-sets "must be taught and learned before they can be used" (Afflerbach & Meuwissen, 2005, p.144).

To help students learn to do self-assessment some instructional practices can be used. Dialogic teaching, for example, can be implemented to teach students how to question and evaluate themselves, their purposes, effectiveness of strategies, their reading comprehension that help meet reading goals and task demands. As Kolencik and Hillwig (2011) stated, a set of awareness raising or thought-provoking questions can be useful for this purpose. Because planning strategies set the parameters for reading acts and inform individuals when they are off task (Afflerbach & Meuwissen, 2005), self-assessment can start operating through a series of pre-reading questions like "Why am I reading this piece?" and "What does this task require?" and continue during-reading with questions

like “Does the text make sense?”, “How do I know I understand what I am reading?”, “Do my efforts meet task demands?”, “Do my efforts align with task demands and my purpose?” As Papleontiou-louca, (2003) stated, students’ ability to determine the presence or absence of information is metacognitive. Moreover, students can also continue doing self-assessment during post-reading by generating predictive and self-testing questions like “What did I learn reading this material? Can I answer follow-up questions? Can I write about this topic? Did I meet my reading-goals? and How does my reading relate to what I already know?” By such questions, students can learn to focus on meaning rather than memorizing the information in the text and generate their own feedback. Therefore, assessing one’s approach to reading and evaluating one’s experiences of strategic reading, students can gain independence and ensure success in the school.

These questions can be presented on rubrics as proposed by Samuels and his colleagues (2005). A rubric of strategic reading can present the following phrases or questions including;

> checked my comprehension during reading, reread when it seemed necessary, looked back to make inferences, made predictions of what might come next, checked my memory of what was read, asked questions, self-monitored, and wrote a summary after each page before moving on to the text page (Samuels et al., 2005, p. 56).

Following students’ self-assessment, teachers can also assess students’ metacognition adequacy in reading by the same rubric. Comparing two, a teacher can inform students about their proficiency with strategic reading and provide some guidance to close the discrepancy between two assessment practices, if there is at all (Samuels et al., 2005).

Describing a pedagogy of metacognition might be straightforward; however, developing the youths' thinking habits in relation to reading might not be as easier as described here. As metacognition training is "a fluid, collaborative, and complex longitudinal interaction between the minds of teachers and the minds of students" (Duffy et al., 1987, p. 365), sufficient amount of time should be allocated for such an interaction.

Prolonging metacognition training. In consideration of the insights gained from previous literature and suggestions offered by the research studies on metacognition instruction, metacognition needs to be "continually addressed, practiced, polished" (Hartman, 2001a, p.40). For this, prolonged training needs recognition (Cubukcu, 2008; Dole et al., 1991; Duffy, 1993; Duke & Pearson, 2008; Gourgey, 1998; Veenman et al., 2006). There can be many legitimate reasons to prolong training periods. For example, as Sternberg (2001) experienced, students might not be welcoming such instructional practices all the time. Especially when they perceive knowledge as a large body of factual data, metacognitive instruction and its practices might seem irrelevant. Either, students might not internalize such practices quickly because they are not used to think metacognitively. They can resist having to do so because they might not understand why metacognition is important for and they might not feel comfortable with the extra effort required (Veenman et al., 2006). For any reasons, metacognition instruction practices should be persistent on the part of both the teacher and students (Gourgey, 1998, 2001; Cubukcu, 2008). Students had better experience metacognition by "doing it repeatedly, over long periods of time, [and] with lots of different texts" (Cubukcu, 2008, p. 9).

A summary of a pedagogy of metacognition in reading; dimensions, their focus, and typical literature-informed instructional practices are presented in Appendix G. For

validating a measurement instrument to identify teaching metacognition in reading classrooms, typical teacher-behavior that a PMR describes will be used to generate items on the ITMR as described in the next chapter of this study.

CHAPTER 3: METHODS

In this section, the procedures to answer the second research question will be reviewed. For this purpose, research design, participants, item generation and scale development, data collection, and data analysis procedures will be presented. As described previously and portrayed in Figure 2, this research has a unique evolving nature. For this reason, scale validation procedures will be presented first.

Validation of the ITMR

Validation of the ITMR was managed in three stages as Schwab (1980) suggested. Stage 1 is item generation, stage 2 is scale development, and stage 3 is the psychometric examination. In the following, the first two stages will be explained; however, stage 3 pertains to the data analysis. Therefore, the last stage will constitute the results chapter of this study.

Stage 1: Item generation. Items were generated right after a PMR was developed. While developing the items, the primary concern was the content validity. To ensure content validity that is the extent a specific set of items reflect the complexity of the target construct within the theoretical content domain (DeVellis, 2012; Hinkin, 1995; Nardi, 2003; Netemeyer, Bearde, & Sharma, 2003), the author utilized deductive and inductive reasoning. To develop the ITMR, an understanding of the phenomenon was investigated and theoretical definition and specification of the construct was developed. For this purpose, a comprehensive set of literatures was reviewed. This comprehensive set included; (d) meditations on metacognition instruction, (e) research-based instructional approaches to metacognition, (f) recent research studies on metacognition training, (g) supplementary instructional techniques for metacognition instruction, (h)

theories of social learning, and (i) assessment criteria for teachers' pedagogies of metacognition. Simultaneously, (a) metacognition theory, (b) characteristics and capabilities of metacognitive readers, and (c) metacognition assessment surveys and inventories were referred continuously to ensure specification with the construct

Based on the literature, a PMR was proposed and dimensions of a PMR were portrayed as presented in the previous section. A PMR includes (a) fostering students' metacognitive knowledge, (b) adopting goal-directedness, (c) integrating language of thinking, (d) scaffolding students' strategic reading, (e) encouraging students' independence with strategic reading, (f) assessing metacognition, and (g) prolonging metacognition training. By the dimensions of a PMR, teacher-behavior fostering students' metacognition was described. Then, these behaviors were transferred into an initial set of survey-items. By so, a table of specification that included a total of 76 items was created.

All items on the ITMR ask respondents to reflect on and rate their firsthand experiences of teaching metacognition in reading classes because it is difficult to predict what to do in a hypothetical situation (Fowler, 1995). The items on the ITMR were positively worded statements so as to control the validity of the responses and systematic error (Hinkin, 1995). All statements were accompanied with a rating scale of target behaviors. The scale ranges from *Not at all Like Me* to *Exactly Like Me* accompanied with a range from 0 to 100. Moreover, the scale is bipolar; it allows the respondents to think of the presence or absence of the target behavior (Sue & Ritter, 2012). In addition, all items were examined on QUAID (question understanding aid) at two intervals as can be seen in Figure 5. QUAID is a free-online tool that is used to assess statements'

semantic, syntactic, and working-memory load features for the best comprehensibility. In order to check these features, the author set the context to reading and uploaded each statement in the question box. Then, by the artificial intelligence on QUAID, each statement's comprehensibility was determined. For example, when the item "I explicitly teach students how to select appropriate reading strategies for the reading task" was checked for its comprehensibility, the author got feedback for an unfamiliar technical term; "explicitly" and a confirmation for the appropriateness of the item to its context; reading. No changes were made following QUAID examinations because most unfamiliar words (e.g. explicitly, monitoring, and feedback) were considered understandable by the focus-group participant-teachers.

Stage 2: Scale development. At this stage, 76 initial items were examined whether and how well they confirm the expectations about the structure and content of the measurement instrument as Hinkin (1995) would suggest. As Lodico, Spaulding, and Voegtle (2010) stated, constructs are non-observable traits that are derived from variables. Therefore, examining the construct validity of the measure pertains to an analysis of the items to capture whether they reflect the full meaning of construct and how they measure the magnitude and direction of the construct regarding the characteristics of a representative sample (Netemeyer et al., 2003). In order to ensure construct validity, as Fowler (1995) suggested, the author (a) consulted experts, (b) interviewed with colleagues in the field, and (c) held a discussion session with in-service teachers. However, it is important to recognize that construct validity can be confirmed by the actual results and it cannot be achieved until the data are analyzed statistically

(Nardi, 2003). In the following, a set of interviews conducted with different stakeholders will be described.

Expert judgments. There were three experts whom the author consulted for their judgments regarding the content and construct validity of the items. They are distinguished scholars who taught at a Mid-Atlantic public research university in the USA during the scale development stage. Each of the experts had at least 25 years of teaching and research experience in metacognition, domain specific learning, strategic processing, strategy teaching, and assessment. Experts were consulted twice for the validity-judgments of the items in this study.

Expert judgments (round-1). On the first round, the initial set of 76 items was taken to the experts. The experts were asked both to respond to the statements and to think how potential participants would comprehend and respond to these statements. They were also asked whether and what kind of problems the respondents might experience while filling out the survey. The experts were asked to evaluate whether the survey covers the construct appropriately and reflects its characterization in the domain of reading. Survey items were revised based on their feedback. Then, the items were presented to cognitive interview participants and focus-group interviewees.

Expert judgments (round-2). The second-round expert review was conducted following the cognitive interviews and focus-group discussion. To sort the most salient items for the final set, an expert was consulted again and the table of specification was finalized (see Appendix H). As can be seen on the table of specification, teaching metacognition was represented by the intersections of teacher's instructional actions and students' metacognitive behaviors in reading. As described in the previous chapter,

teacher-behaviors were developed by a PMR and students' metacognition behaviors in reading were informed by previous literature on metacognition theory, metacognition assessment, and metacognition training. To help with students' planning; task and text evaluation, strategy selection/regulation and monitoring text understanding, and performance evaluation, teachers' modelling, explaining, explicitly teaching, scaffolding, assessing, and encouraging students' independent metacognitive behavior was narrowed down to the most salient items. Therefore, each intersection was represented by a single item. The last version of the ITMR was reduced to 40 items following the meeting with an expert (see Appendix I).

Cognitive interviews. Cognitive interviews are one-to-one interviews with the participants during which the participants were asked to describe their thoughts aloud as they absorb a statement, search their memories for information required, and turn the information into an answer accordingly (Fowler, 1995). It provides a way to examine whether and how statements are understood and ratings are generated (Fowler, 1995, p.112). By cognitive interviews, not only problems in comprehending the statements and response selection but also appropriateness and relevance of the content can be determined (Fowler, 2009). To ensure these benefits, think aloud interviews were conducted. All interviewees were familiar with the purpose of the research, the author, and metacognition theory and reading education.

To conduct cognitive interviews, the author requested help from four colleagues (3 female and 1 male). At the time of cognitive interviews, the interviewees were graduate students in the College of Education at a Mid-Atlantic public research university. The interviewees were in their 2^{nd}, 3^{rd}, 4^{th} and 5^{th} year of doctoral degree,

respectively. They specialized in literacy education. Their research interests included reader identity, thinking skills, strategic processing, activity theory, transactional reader response theory, and families' and teachers' roles in literacy development. All interviewees held a reading specialist certificate. Their teaching experiences ranged from 8 to 13 years. They taught either at elementary (N=2) or middle-schools (N=2) before they started their doctoral degree. At the time of cognitive interviews, they either tutored elementary school students or worked with elementary and middle-school teachers.

The purpose of the cognitive interviews was to review the initial set of 76 items. Each interview took around 40 minutes. On average, 20 statements were studied with each participant. The interviewees were specifically asked to paraphrase their understanding of the statements, define the terms, express any confusion or uncertainties while rating the statements and thinking about the classroom implementations of the instructional practices. Moreover, participants were also asked how confident they were with their answers, how they arrived at choosing a number, and how their answers would differ from mainstream classroom teachers.

Cognitive interview participants were mostly concerned with the conventions of language. Based on their feedback, grammatical revisions were done. Moreover, items that communicate the same or very close meanings were identified. Then, suggestions gathered from the colleagues and the notes for revisions and reductions were taken to the second round of the expert-judgment meeting. Along with the cognitive interview technique, the author benefited from focus-group discussion. In the following, the procedures followed for this technique will be described.

Focus group discussion. Focus group interviews are systematic discussions about the construct under study. By focus group discussions, it is possible to "evaluate the assumptions about vocabulary, the way people understand terms or concepts that will be used in survey instruments" (Fowler, 1995, p.105). By focus group discussions, the threads to standardization can be identified and the complexities that would cause ambiguity can be neutralized. Small group discussions can be done with five to eight people (Fowler, 1995). For this study, a focus-group discussion was conducted with eight in-service teachers who were pursuing a master's degree in reading education at a Mid-Atlantic public research university.

Fowler (1995) stated that focus group discussions can be conducted with homogenous or heterogeneous groups depending on the research focus. For this study, relatively a homogeneous group was considered appropriate regarding the previous research studies. That is, the focus-group participants either taught at an elementary (N=5) or at a middle (N=3) school during the time of discussion. The focus-group interviewees had two to eight years of teaching experience.

The focus group discussion was conducted at the beginning of a graduate class. As stated, the focus-group participants were graduate students at various stages of a master's degree. They were familiar with metacognition theory, metacognition instruction, and metacognition assessment practices. Still, for clarity and with time constraints, the focus-group interviewees were quickly reminded the purpose and nature of metacognition instruction. Then, they were distributed 76-item ITMR and asked to discuss whether the wording and descriptions proposed in the statements convey consistent meaning and how these statements relate to an understanding of teaching

metacognition in classrooms. For this task, they were given a total of 60 minutes. During the first 30 minutes, the participants studied the statements on their own. Then, focus-group participants and the author discussed the confusing parts or similar items for another 30 minutes. During the discussion, the author took notes for item reduction and offered suggestions to ameliorate the problematic parts.

Focus-group participants were also asked to respond to the statements and think whether they would need assistance for clarification or get confused by the statements. Therefore, QUAID feedback regarding unfamiliar vocabulary was cross-checked. Participants reported no problems with interpreting the items that included "feedback, explicitly, and monitoring" and there were no inconsistencies with their interpretations. Therefore, these vocabulary items were kept intact for the 40-item ITMR. Following the discussion session, the author made small language-revisions and took their suggestions to the second round of expert-judgement meeting for item reduction.

Simulating online survey completion. After the interview or discussion procedures, the most salient 40 items were transferred to an electronic platform (Qualtrics). Before the survey was delivered to the participants, a few procedures were completed to control any possible factors that might impact participants' experiences with the ITMR. For this purpose, the author tested the "feel and look" of the survey herself and recorded survey completion time. For the author, survey completion took around 6 minutes. Then, the author sent the survey link to a psychologist, neurobiologist, and graphic artist to get their feedback. While neurobiologist and graphic artist were mostly concerned with the font of the letters, the psychologist suggested an inclusion of a progress bar. Based on their feedback, necessary font adjustments were made and the

ITMR was accompanied with a progress bar. Following these steps, the ITMR was ready to be delivered to respondents Appendix I).

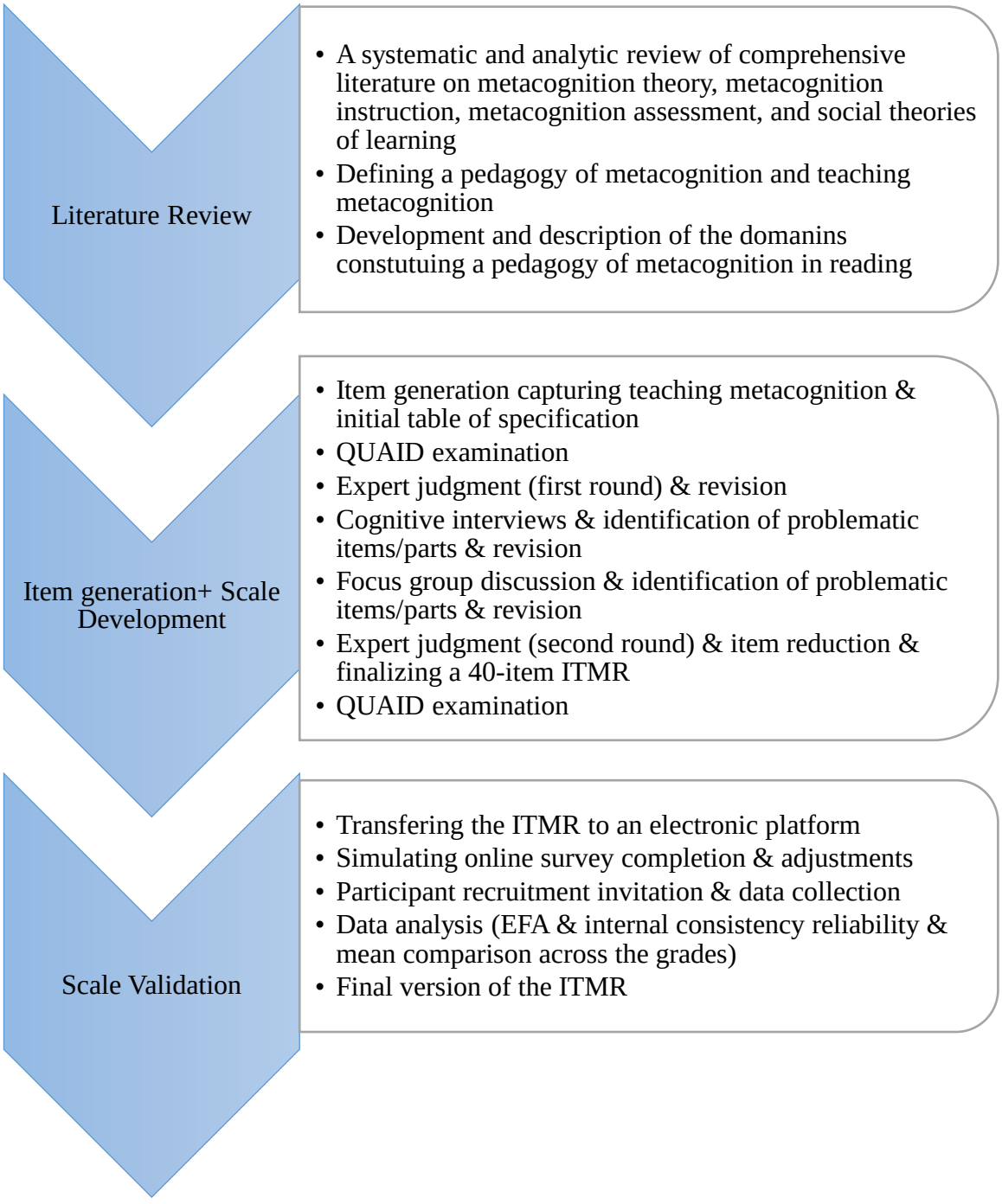

Figure 5. Procedures followed to validate the ITMR

Research Design

This study used a survey research method to answer the second research question: What are the structural properties of a measure developed to identify teaching metacognition in reading classrooms (the ITMR)? Survey research is a systematic method for collecting data from a representative group in order to generate quantitative descriptions (statistics) with a purpose of estimating target aspects of the broader population (Fowler, 2009). Surveys are the tools to answer a research question "when it is most efficient to simply *ask* those who can inform the question" (Baumann & Bason, 2011, p.405 emphasis in original). It typically involves the administration of a questionnaire or conducting interviews with the relevant group (Baumann & Bason, 2011).

This portion of the study is an example of structured-survey research. As Baumann and Bason (2011) defined, structured surveys are the "research tools that have persons respond to a series of questions" (p.405) so as to determine certain characteristics, attitudes, or behaviors. Structured surveys help generate numerical data that can be interpreted through descriptive or inferential statistics. Considering people's tendency to give more honest answers when they take surveys on a computer screen (Sue & Ritter, 2012) and their being less likely to over-report desirable or under-report undesirable behaviors when responding to the statements on their own (Bradburn et al., 2004), the survey was delivered by a computer-assisted survey method. The respondents read a set of items representing metacognition instruction on their machine and responded to them without any aid or influence from the author as suggested by Andres (2012).

Data Collection Procedure

Data collection was the last step before the psychometric examination. For this purpose, some procedures were completed as in the following. Before participants were delivered the survey, standardization which is highlighted as the first and preliminary requirement of a measurement instrument by Sapsford (1999) was ensured by fixing the order of the statements. That is, every participant responded to precisely the same statements in the same order and on the same platform. Standardization is important not to attribute the variation to any other factors, but solely to respondents' differences with the construct.

Following standardization and transforming the survey to an online platform that is sustained by Qualtrics, the author posted a research invitation that included the survey link and research details to her academic and social networks (e.g. Facebook, LinkedIn, and Twitter) to recruit respondents. Meanwhile, the sample was informed about the purpose and theme of the research, the task to be carried out, survey completion time, scale type, and participation criteria.

To control social desirability, which is the tendency to make oneself look good with respect to norms when responding to items on a measurement instrument, Bradburn et al.'s (2004), Fowler's (1995, 2009), Netemeyer, Bearde, and Sharma's (2003), and Sue and Ritter's, (2012) suggestions were taken into consideration. For this purpose, the author assured anonymity and confidentiality of the data. The respondents were reminded that no answer is associated with any personal information or respondent-identifier, no answer places any respondent in a negative light by judging their teaching proficiency, no answer changes any respondent's current professional status, and no answer is and will be

shared with anybody else including other participants or respondents' employee. The priority of response accuracy was also reminded for the research purpose. The consent form including these details was presented in the introductory section of the survey (see Appendix I). Participants were also offered a downloadable consent form for their own records when they got to the online survey.

Participants

Target population of this study was determined as teachers who teach reading since they could inform this research's second-question best. However, as *teachers who teach reading* is a quite broad category, it was specified regarding empirical research and metacognition development patterns. First of all, considering empirical metacognition instruction research's participants and the importance of early intervention initiatives to foster students' metacognition, the target population was to be selected from early grades. It is known that children of 6 to 8 years may show evidence for an adequate level of metacognitive knowledge and might engage in comprehension monitoring when promoted (Baker, 2005 as cited in Veenman, 2016). Metacognitive skills, on the other hand, become sophisticated and academically oriented when children are formally required to utilize a metacognition repertoire (Veenman, 2016). From the age of 8, children can show evidence for metacognitive strategies efficiently (Veenman, 2016). Therefore, regarding students' *readiness for metacognition*, the earliest grade was determined as the first grade.

Furthermore, considering the domain of this study eighth grade was determined as the upper limit. This is because until the age of 14, domain specific manifestations of metacognition are substantial (Veenman, 2016). In addition to theoretical and empirical specifications, Andres's (2012) criteria of grouping unit, geographic boundaries, and time

period was also utilized so as to narrow the sample. Therefore, the sample for this study was defined as grade 1 to grade 8 teachers who teach reading or language arts in the United States of America during the 2016-2017 academic year.

Participant recruitment. This study employed a non-probability sampling technique because of the author's limited access to target population and time-constraints. Even if it might have been possible to employ cluster sampling, this study utilized convenience sampling to recruit participants. For this purpose, the author requested help from her academic and social networks (e.g. LinkedIn, Facebook, and Twitter) via a research-invitation. The author also required extant respondents or colleagues to pass along the survey link to someone who can be a representative of the target population, if possible. The complete list of groups or organizations that helped with data collection can be found in Appendix J.

In addition to aforementioned networks, a survey project was also created on MTurk. As MTurk is an internet marketplace and enables use of human intelligence to perform tasks, initially it was considered that MTurk could help this study to reach many teachers from diverse settings in the USA. However, even if participant-selection filters (education level, profession, and the location) were created, the author could not control the respondents who did not represent target population from taking the survey. An initial analysis of the data help the author to find out that there were respondents out of the USA and there were respondents who completed the survey under 3 minutes. For these reasons, the data gathered via MTurk were not used in this study.

Determination of the sample size. The author considered recommendations in the literature and requirements of the data analysis technique to determine the sample size. Sample size, in fact, is a controversial issue in literature. Nunnally (1978) suggested that 300 participants can be sufficient to develop a new scale while Comrey (1988, as cited in DeVellis, 2012) stated that a sample size of 200 can be adequate for an ordinary factor analysis of 40 items. However, Nardi (2003) recommended to recruit a small group of respondents for e-mail surveys. Still, how *small* a sample size can be a subjective decision. For this reason, Bartlett, Kotrlik, and Higgins (2001) and Hinkin's (1995) suggestions are take into consideration. Hinkin (1995) stated that a sample size of minimum 150 can be sufficient to develop a scale or the ratio of observations to independent variable should not fall below a minimum of 5 (Bartlett et al., 2001). The number of responses was 314 after a month of data collection period. However, the response set which satisfied the recruitment criteria had *N*=281 teachers of whose *N*=211 (75.1%) were elementary and *N*=70 (24.9%) were middle-school teachers.

The participants were recruited on the premise of volunteerism. There were no incentives to motivate respondents' participation in this study. Therefore, considering divergent recommendations for the sample-size, lack of incentives, and trade-offs of online surveys, the author examined the adequacy of sampling. For this purpose, the author conducted an analysis of component saturation considering Guadagnoli and Velicer (1988) and de Winter et al., (2009) recommendations (see Table 1).

Guadagnoli and Velicer (1988) argued that previously aforementioned rules for sample size lack both empirical and theoretical rationale. For this reason, Guadagnoli and Velicer (1988) examined the conditions under which a component pattern becomes stable

to the population pattern by a Monte Carlo simulation procedure. They systematically varied sample sizes, number of variables, number of components, and component saturation that is the magnitude of correlation between the variables and the components. They found that contrary to the popular rules (e.g. ratio of instances to variables), component saturation was the key factor for the stability of a component pattern. Similarly, de Winter et al.'s (2009) run a Monte Carlo simulation of various sample sizes, variables, and components. They similarly found equivalent findings. That is, when the data are well-conditioned with high loadings, a small number of factors, and high number of variables; EFA can yield reliable results for a sample size that is well below N=50. In other words, as de Winter et al., (2009) stated, an N=50 can be a reasonable absolute minimum for the exploratory factor analysis in this study.

The component saturation was examined by an analysis of component pattern that pertains to the number of variables defining a component and the magnitude of the loadings (see Table 1). That is, if components possess at least four variables with loadings ≈.60, the patterns can be interpreted regardless of the sample size (Guadagnoli & Velicer, 1988). On the other hand, when the component saturation is at the lowest level (≈.40), the effects of sample size and number of variables become most evident. At such a saturation level, a sample size of 150 would be considered appropriate for the component with many variables (10-12) loading on it. However, if the component has few variables with low loadings (≈.40), then a sample size around 300 can be an appropriate choice. As the saturation pattern reveals, when the component is well-defined with 3 high loadings (≈.80) on it, there is no concern with the sample size while

interpreting the components. By these criteria, it was confirmed that the sample size was adequate for the analysis.

Table 1

Component saturation analysis guideline

Magnitude of loadings	Number of variables	Sample size
≈ .80	≥ 3-4	No concern with the sample size
≥. 60	≥ 4	No concern with the sample size
≈ .40	≥ 10	At least 150
≈ .40	< 6-7	At least 300

Demographics of the sample. Demographics data reported participant teachers' gender, teaching experience, grade that was taught, and education level during the data collection period. Of 281 participants, 211 were elementary teachers (75.1%) and 70 were middle-school teachers (24.9%). Elementary teachers were dominantly represented by females; there were only nine (4.3%) males. There were 71 (33.6%) teachers with a bachelor's degree and 140 (66.3%) of elementary school teachers had a graduate degree; 137 (64.9 %) of them had a master's and three had a doctoral degree. These teachers taught in various states of the USA; 41 states and D.C. as can be seen in Appendix K. Among these states, Texas, California, and New York stood out. As seen in the following (see Table 2), the grade-wise distribution of elementary school teachers ranged from a minimum of *N*=34 to a maximum of *N*=60. Finally, their teaching experience (in years) ranged between a minimum of 1 and a maximum of 40 years with a *M*=14.66, *SD*=8.85 (see Figure 6).

Table 2

Distribution of elementary school teachers across the grades

Grade	Frequency	%
1	34	16.1
2	48	22.7
3	60	28.4
4	35	16.6
5	34	16.1
Total	211	100

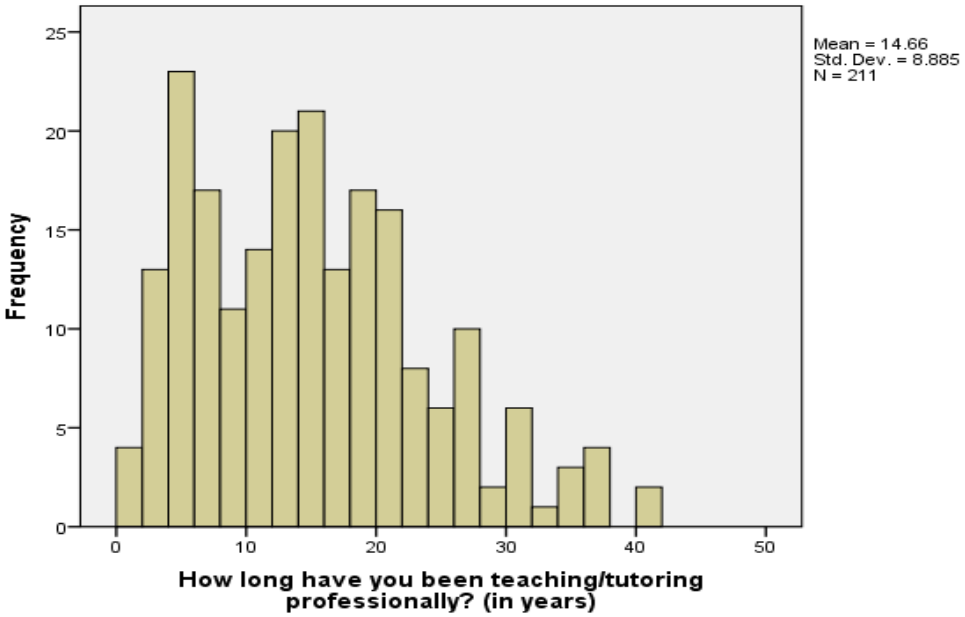

Figure 6. Teaching experience distribution for elementary school teachers

There were 70 middle-school teachers in the sample group. Four (5.7%) were males and 66 (94.3%) were females. There were 25 (35.7%) teachers who had a bachelor's degree and 45 (64.3%) teachers with a graduate degree; 42 (60%) of them had a master's and three had a doctoral degree. Middle-school teachers taught in various

states of the USA (see Appendix L). Among these states, Texas and Florida stood out. As seen in Table 3, the grade-wise distribution of the middle-school teachers ranged from a minimum of *N*=34 to a maximum of *N*=60. Finally, their teaching experience ranged between 1 to 35 years with a *M*=12.31, *SD*= 7.64 (see Figure 7).

Table 3

Distribution of middle-school teachers across the grades

Grade	Frequency	%
6	25	35.7
7	20	28.6
8	25	35.7
Total	70	100

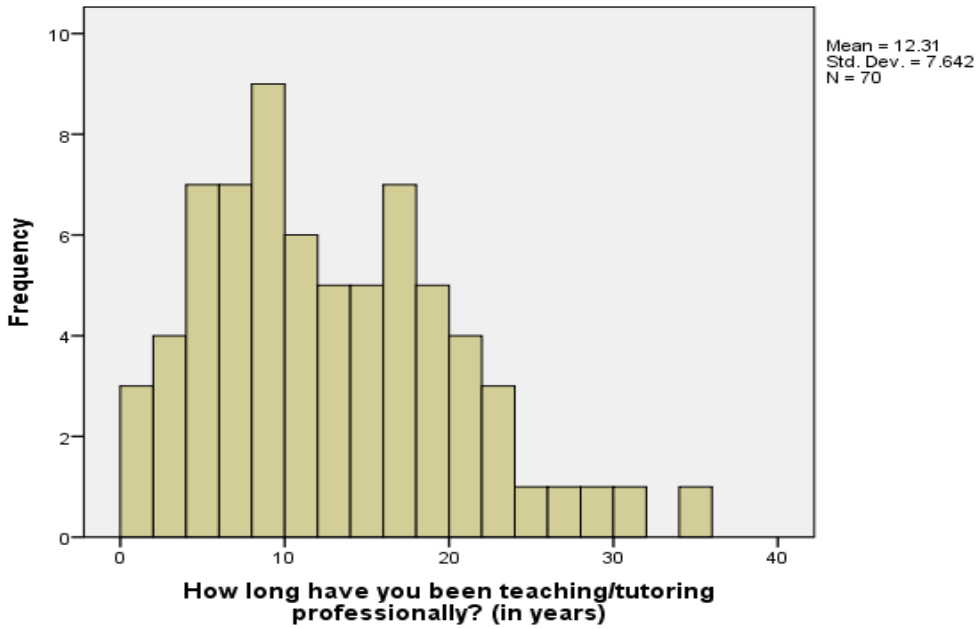

Figure 7. Teaching experience distribution for middle-school teachers

To examine sample's approximation or deviation from the target population, the author searched for demographics (i.e. gender, professional experience, and education level) from national data collections (Schools and Staffing Survey; SASS). SASS provides a detailed picture of U.S. elementary and secondary schools and their staff by depicting information from a representative sample of public and private K-12 schools in 50 states and the District of Colombia.

The most recent comprehensive data belonged to 2011-2012 academic year (Rahman, Fox, Ikoma, & Gray, 2017). It was reported that in 2011-2012 academic year, there was a total of 3.385.200 teachers. Of these teachers, 1.626.800 (48.05%) were primary teachers and 592.100 (17.49%) were middle-school teachers. Of all teachers, 76% were female and 24% were male. At primary school level, 89.3% were female and 10.7% were male. At middle-school level, female teachers constituted 72.6% and 27.4 % of teachers were male. On average, teachers had 14 years of teaching experience; 14 and 13.6 years for elementary and middle-school levels, respectively (Goldring, Gray, & Bitterman, 2013). According to a recent report, 20% of K-12 students were taught by teachers with 1-5 years, 23% by teachers with 6-10 years of experience, 20% by teachers with 11-15 years, 23 by teachers with 16-25, and 14% by teachers with 26 or more years (Rahman et al., 2017). Moreover, master's degree was the highest education degree that teachers held. At elementary school level, 41.2% of teachers held a bachelor's, 47.3% had a master's, and 8.4% held a degree higher than a master's. At middle school level, 38.8 % of teachers had a bachelor's degree, 48.5 % held a master's, and 9.2% held a degree higher than master's (Goldring et al., 2013).

Because of sample's divergence from its population especially by gender, education level, and percentage of elementary and middle-school variables as can be seen in the following (see Table 4), the data were weighted by school level and then by education level for the analysis.

Table 4

Comparison of sample to population by demographics

Demographics	2011-2012 NCES		Current Study	
	EST	MST	EST	MST
Gender				
Female	89.3%	72.6%	95.7%	94.3%
Male	10.7%	27.4%	4.3%	5.7%
Teaching experience				
Years	14	13.6	14.66	12.31
Education level				
Bachelors	41.2%	38.8%	33.6%	35.7%
Masters	47.3%	48.5%	64.9%	60%
Higher than Masters	8.4%	9.2	1.4%	4.3%
School level	48.05%	17.49%	75.1%	24.9%

Note. Higher than Masters stands for a degree including an educational specialist or professional diploma, a certificate of advanced graduate studies, or a doctorate or first professional degree. EST stands for elementary school teachers and MST stands for middle-school teachers.

Poststratification. To conform population parameters regarding the distribution of elementary and middle-school teachers and the distribution of education levels in each group, the sample data were adjusted by poststratification. The proportions of elementary school teachers (EST) and middle-school teachers (MST) were weighted in reference to Goldring et al`s statistics (2013). Therefore, elementary school group was weighted by .639 (48.05/ 75.1) and middle-school group was weighted by .70 (17.49/24.9) not to bias

any estimates when whole-group exploratory factor analysis was run. However, because the whole-group analysis did not produce an interpretable solution, the author decided to run the analysis for each school group separately.

The author run many iterations of exploratory factor analysis (EFA) at each school level. For this purpose, at middle-school level bachelor's degree was weighted by 1 (38.8/35.7), master's degree was weighted by .8 (48.5/60), and a degree higher than master's was weighted by 2.1 (9.2/4.3). Then, correlation matrix of original data was analyzed and 13 items were found not correlated at p .01. At middle-school level, even if the sample size was confirmed satisfactory for the factor analysis, the EFA with weighted, original, and reduced data (by correlation matrix) produced different solutions. For this reason, the solution of the ITMR at middle-school level will not be presented in this study. However, by increasing the sample size as recommended in the literature, the ITMR at middle school level is to be examined by future research.

Similarly, two iterations of EFA were run at elementary school level. For this purpose, bachelor's degree was weighted by 1.2 (41.2/33.6), master's degree was weighted by .72 (47.3/64.9), and a degree higher than master's was weighted by 6 (8.4/1.4). The EFA was run with original data and with weighted data. These solutions identified the same items constituting the ITMR at elementary school level. With a purpose to proximate population parameters, in the following data (*weighted-elementary school-data*) analysis procedures will be presented.

Data Analysis Procedure

Step 3: Psychometric examination. Psychometric examination was the last stage of the scale validation in this study. The *weighted data* were analyzed for the (1) variation in the items so that it could possibly be explained by fewer factors, (2) possible mean differences in self-reported classroom metacognition instruction practices across the grades, and (3) possible correlations among the dimensions of the ITMR. However, before analyzing the data, the author examined the missing data for the quality of statistical inferences (Dong & Peng, 2013).

Missing data analysis and data imputation. Missing data were analyzed by Bennett's (2001) and Scheffer's (2002) criteria. Bennett (2001) stated that missing data ≥ 10 % are likely to be biased and Scheffer (2002) argued that a missing rate of 5% or less is insignificant. Examining the missing data in elementary school group, the author found that there were no high extremes (see Appendix M). The total number of missing observations for any given item ranged from 0 to 10 (0%- 4.7%); the highest missing data percentage was 4.7% for a single item (the last item on the scale) with 10 counts. However, Little's MCAR test was significant (χ^2 =1469.189, *df*=1050, p <.05); it can be interpreted as the data were not missing at completely random. Examining the missing data table and missing value patterns, one can see that the missing data counts or percentages increases once one reaches the last section of the survey (i.e. items 31, 32, 33, 34, 39, 40). Moreover, because the items were not presented in alignment with traditional stages of classroom instruction and because the items were cognitively demanding, the missing data in this study might stem from respondents' fatigue, boredom, or recklessness. That is, the data might be missing at random.

To examine the data by exploratory factor analysis and to compare the means across grades, the author utilized SPSS, 22 to impute substituted values for the missing data. Scanning the data, the program did imputation by linear regression. That is, each imputed value was predicted from a regression equation; information in the complete observations was used to predict the missing values.

Determination of data's suitability to factor analysis. Following the imputation process, to verify whether the data were suitable to the EFA, initially Kaiser-Meyer-Olkin (KMO), Bartlett's test of Sphericity, and correlation matrix was examined. KMO varies between 0 and 1, and a value of minimum .6 is considered acceptable for the adequacy of sampling to run an EFA. Then, Bartlett's Test of Sphericity was checked. The Bartlett's test checks the null hypothesis; the correlation matrix is the identity matrix-the variables are orthogonal. Under H_0, it follows a χ^2 distribution with a [p x (p-1) / 2] degree of freedom and it should be $p < .05$ (statistically significant). However, Bartlett's test has a drawback; it tends to be statistically significant when the number of instances is high. For this reason, the correlation matrix (coefficients) was examined for the linear correlation among items.

The factorability adequacy of sampling at elementary school level (ESL) was satisfactory. The KMO test for elementary school group indicated a value of .953, Bartlett's test of sphericity was significant ($\chi^2 = 7105.197$, $df = 780$, $p < .05$), and all item correlations were significant at $p < .05$.

Determination of the number of factors. After confirming data's factorability, a principal component analysis (PCA) was conducted to determine the number of the initial factors. For this purpose, Eigenvalues, the scree test, Monte Carlo PCA for parallel analysis, and a rule of thumb were used.

Eigenvalues represent the amount of information that can be captured/explained by a factor (DeVellis, 2012). For this reason, factors with eigenvalues less than 1.0 were not retained since a factor must account for at least as much variance as by any single item (Netemeyer et al., 2003). As can be seen in Appendix N, eigenvalues ≥ 1 were 6 at ESL. In addition, the scree test was examined to confirm the number of factors for extraction. The scree test uses relative eigenvalues as a criterion and visualizes the plot of eigenvalues associated with their successive factors. The number of the factors can be determined by looking at the drop in the eigenvalue magnitude across successive factors. Ideally, the progression of factors will have a point where an abrupt transition from vertical to horizontal happens; the amount of information that could be explained drops off suddenly (DeVellis, 2012). By the scree tests, one factor solution was considered optimal. To confirm this decision, a Parallel Analysis on Monte Carlo PCA simulation was run. By computing eigenvalues for N=211 with an assumption that the correlation among items are only due to sampling error (Netemeyer et al., 2003), parallel analysis generated estimated eigenvalues. By a systematic comparison of eigenvalues generated by a PCA and a Monte Carlo PCA simulation, one factor solution was considered appropriate. Lastly, another rule of thumb was also satisfied for the final decision. That is, when a factor explains at least 5% of the total variance, it can be considered meaningful (Netemeyer et al., 2003). In this study, the second largest factor explained

less than 5% of the total variance. Therefore, factor analysis was run for a unidimensional model.

Factor analysis. Following the previous steps of factor extraction, a principal axis factoring with varimax rotation was conducted. This is because a PCA explains the total variability by the combination of all original variables whereas the shared variance leading items to cluster specifically can be explained by a principal axis factoring. Moreover, information was not put into the most meaningful and organized form with unrotated factors. Factor rotation increases the interpretability of the factors by clustering items that are characterized predominantly by the same single factor.

Item retention. Following the previous steps, the most salient items were determined by examining the communalities and rotated factor loadings and then by regarding the scale's content validity. Netemeyer and colleagues (2003) suggested that item loadings less than .40 should not be considered substantial and a factor should be identified when at least three items load on it significantly; >.40. Therefore, items which load insignificantly (<.45) and items with extremely high loadings (>.90) were deleted from the final ITMR.

In addition to considering communalities and rotated factor loadings, the author also regarded content validity to retain items. That is, items that contained information the author deemed relevant to other items for classroom practices of metacognition instruction were subjected to an examination to its salience. For this reason, some items were not retained even if they had communalities ≥ .40. For example, the item "I have students assess their own text evaluations (e.g. topic, structure, or genre) before reading" with a communality of .44 was not retained because there were other items directly

related to this item. Once students assess their task evaluation, strategy selection, monitoring, or task performance they most probably assess their text evaluation as strategy selection, comprehension regulation, and performance evaluation builds on planning (task and text evaluation) reading. By these procedures, the final ITMR included 24 items at elementary school. This scale will be presented in the results chapter of this study.

Internal consistency reliability. After the most optimal solution was identified, the scale's reliability was confirmed as it is another condition for validity (Fowler, 1995; Nunnally, 1978). For this purpose, internal consistency reliability-coefficient alpha- was calculated. Internal consistency reliability is concerned with the homogeneity of the items within the scale and the proportion of variance accounted by the true score of the latent variable (DeVellis, 2012). It assumes that if the scale items have a strong relation to their latent construct, then they will have a strong relation to each other. Because the relation between scale items and the latent variable cannot be directly observed, inter-item correlations can help identify whether the scale is internally consistent and its items measure the same variable (DeVellis, 2012). Therefore, Cronbach's coefficient alpha (α) was calculated to examine the scale`s adequacy. As DeVellis (2012) and Hinkin (1995) suggested an $\alpha \geq .70$ adequate, the scale was adequate to use.

Comparison of mean differences at item- and dimension- level. Following the structural analysis of the ITMR, the items and dimensions at each grade were averaged to identify any grade-level instructional differences. However, to determine the appropriate statistical test for this analysis, initially the assumptions of parametric tests were examined as in the following.

Testing the assumptions. Independence of observations, normality, and homogeneity of variances were tested to determine the statistical test. However, it is important to remember that the data were collected by a non-probability sampling technique. While deciding between a non-parametric and parametric test, it was also considered.

Conceptually, the assumption of independence of observations was satisfied as the data were collected online and teachers were not likely to influence each other's responses. Checking the histograms, Q-Q plots, normality-tests (Kolmogorov-Smirnov and Shapiro-Wilk test), and kurtosis (mostly leptokurtic) and skewness (mostly negatively skewed) at item and dimension levels, it was found that the data violated the normality assumption. That is, the data were not normality distributed at any grade level. However, one-way ANOVA is a robust test against the normality assumption; it tolerates violations to normality assumption with only a small effect on the Type I error rate. For this reason, the last assumption of homogeneity of variance assumption was checked to determine the statistical test. It was found that the data violated this assumption at 11 item levels (2, 6, 9,10,11,18, 25, 33, 34, 35, 36) and at the dimension of modeling constituted of item 1,9,17,25,33 (see Appendix O).

Determination of the statistical test. Considering the data's characteristics (non-random, non-normal, unequal group sizes, and mildly heterogeneous), a non-parametric test was considered appropriate. To examine the mean differences of self-reported metacognition instruction practices across the grades, a Welch's test and Games-Howell post hoc analysis was run. By so, mean differences (H_0: $\mu_{grade1} = \mu_{grade2} = \mu_{grade3} = \mu_{grade4} = \mu_{grade5}$) were examined at items (40) and dimensions level (i.e. modelling, explaining,

explicitly teaching, teachers' scaffolding by collaborating with students, peers' scaffolding by metacognitive discussions, teachers' metacognition assessment, students' self-assessment of strategic reading, and opportunities for students' demonstration of independent strategic reading).

Correlation analysis at dimension-level. Lastly, to examine the relation among the ITMR's dimensions (H_0: $\rho_s = 0$), a series of correlation analyses were run. Regarding the data's characteristics as described earlier, non-parametric correlation analyses- Spearman's correlations- were conducted with a p. 05.

The psychometric examination described in this section helped understand the structure of classroom metacognition instruction in the domain of reading, grade-wise instructional differences, and correlations among the dimensions of the ITMR as will be portrayed in the following chapter.

CHAPTER 4: FINDINGS

In this chapter, the second research question will be answered. By the findings of previously described data analysis procedures, the optimal solution of the ITMR, the scale's internal consistency reliability, mean difference comparisons of classroom metacognition instruction practices across the grades at item- and dimension-levels, and correlation analyses among the ITMR's dimensions will be presented in the following.

The ITMR at Elementary School Level

The ITMR had a KMO of .961 and a significant Bartlett's test of sphericity ($\chi 2$ =5624.254, *df*=276, *p* <.05). All correlations were significant at p. 05. A principal axis factoring with varimax rotation generated a unidimensional model for the self-report scale of classroom metacognition instruction. This model accounted for 60 % of the total variance. Item loadings ranged from .865 to .666 (see Table 5). The ITMR`s internal consistency reliability was calculated as α=.97 for 24 items.

Table 5

The ITMR at elementary school level

Items	Factor Loadings
I have students demonstrate their independent text evaluations (e.g., topic, structure, or genre) before reading.	.865
I have students demonstrate their independent task evaluations.	.848
I have students assess their own task evaluation.	.835
I have students discuss their text evaluations (e.g., topic, structure, or genre) before reading.	.820
I explicitly teach students how to evaluate their task performance.	.818

I explain why evaluating task performance is important.	.813
I have students assess their own task performance.	.801
I explicitly teach students how to evaluate the task they are given.	.801
I have students discuss their strategies selection for the reading task.	.799
I have students assess their own monitoring text understanding during reading.	.798
I have students demonstrate their independent task performance evaluations.	.794
I explain why task evaluation is important for task performance.	.788
I explicitly teach students how to evaluate the text (e.g. topic, structure, or genre) before reading.	.781
I provide feedback on students' strategy selections for the reading task.	.779
I model how I evaluate my task performance.	.778
I help students while they are evaluating the text (e.g., topic, structure, or genre) before reading.	.763
I provide feedback on students' monitoring text understanding during reading.	.758
I provide feedback on students' task performance evaluations.	.749
I have students assess their own strategy selection for the reading task.	.746
I have students discuss their task evaluations.	.693
I help students while they are selecting appropriate reading strategies for the reading task.	.690

I provide feedback on students' text evaluations (e.g., topic, structure, or genre) before reading.	.689
I help students while they are evaluating the task they are given.	.688
I have students demonstrate their independent monitoring text understanding during reading.	.666

The extant solution of the ITMR satisfied Netemeyer and colleagues (2003) criteria. They stated that factors should account for 50% to 60% of the total variance satisfactorily. The ITMR composed of 24 items (Appendix P) explained 60% of the total variance by a single factor (α.97).

Metacognition Instruction across Elementary Grades

To compare metacognition instruction practices across elementary grades, a non-parametric test was run at item- and dimension-levels. By a Welch's test, it was found that item means of self-reported classroom metacognition instruction were not statistically different at any two elementary grade levels. The Welch's test identified only one item (i.e. 6) that had statistically significant different means at least two grade levels, F (4, 89.62) = 2.95, p <.05. However, because this item was not captured by the ITMR's best solution and because it did not represent the trend in the data set, it will not be discussed in this study.

Mean difference comparison at item-level did not provide sufficient evidence for metacognition instruction's grade-wise variation. Therefore, mean differences of self-reported classroom metacognition instruction were examined at dimensions' level. By a Welch's test, it was also confirmed that there were no statistically significant mean differences in self-reported classroom metacognition instruction practices by dimensions

at any two grade levels (F_{model} (4, 88)=1.15 p=.34, $F_{explain}$ (4, 87.887)=2.25, p=.07, $F_{explicitlyteach}$ (4, 89.6)=.942, p=.444, $F_{scaffoldteach}$ (4, 90.5)=.702, p=.59, $F_{scaffolpeer}$ (4, 90.36)=1.56, p=.19, $F_{assessteach}$ (4, 89.6)=1.70, p=.156, $F_{assesself}$ (4, 89.97)=.835, p=.506, and $F_{independet}$ (4, 90.7)=1.14, p=.339). Still, as can be seen in Figure 8, metacognition instruction represents an interesting congruent pattern across the grades. For this pattern, in the following, the findings of correlation analyses will be presented.

Correlations among the ITMR's Dimensions

A series of Spearman's correlation analyses was conducted to examine the relations among eight dimensions of the ITMR. A two-tailed test of significance indicated that all correlation coefficients were statistically significant, strong, and positive, r_s (211) = +.68, p < .01 (see Table 6).

Table 6

Correlations among the ITMR's dimensions

Dimensions	1	2	3	4	5	6	7	8
1. model	*	.80**	.80**	.72**	.68**	.72**	.70**	.71**
2. explain		*	.86**	.77**	.75**	.74**	.76**	.76**
3. explicitly teach			*	.81**	.78**	.80**	.80**	.78**
4. scaffold-teacher				*	.79**	.83**	.75**	.74**
5. scaffold-peer					*	.80**	.85**	.80**
6. assess-teacher						*	.80**	.80**
7. assess-self							*	.85**
8. independent								*

***p<.01.*

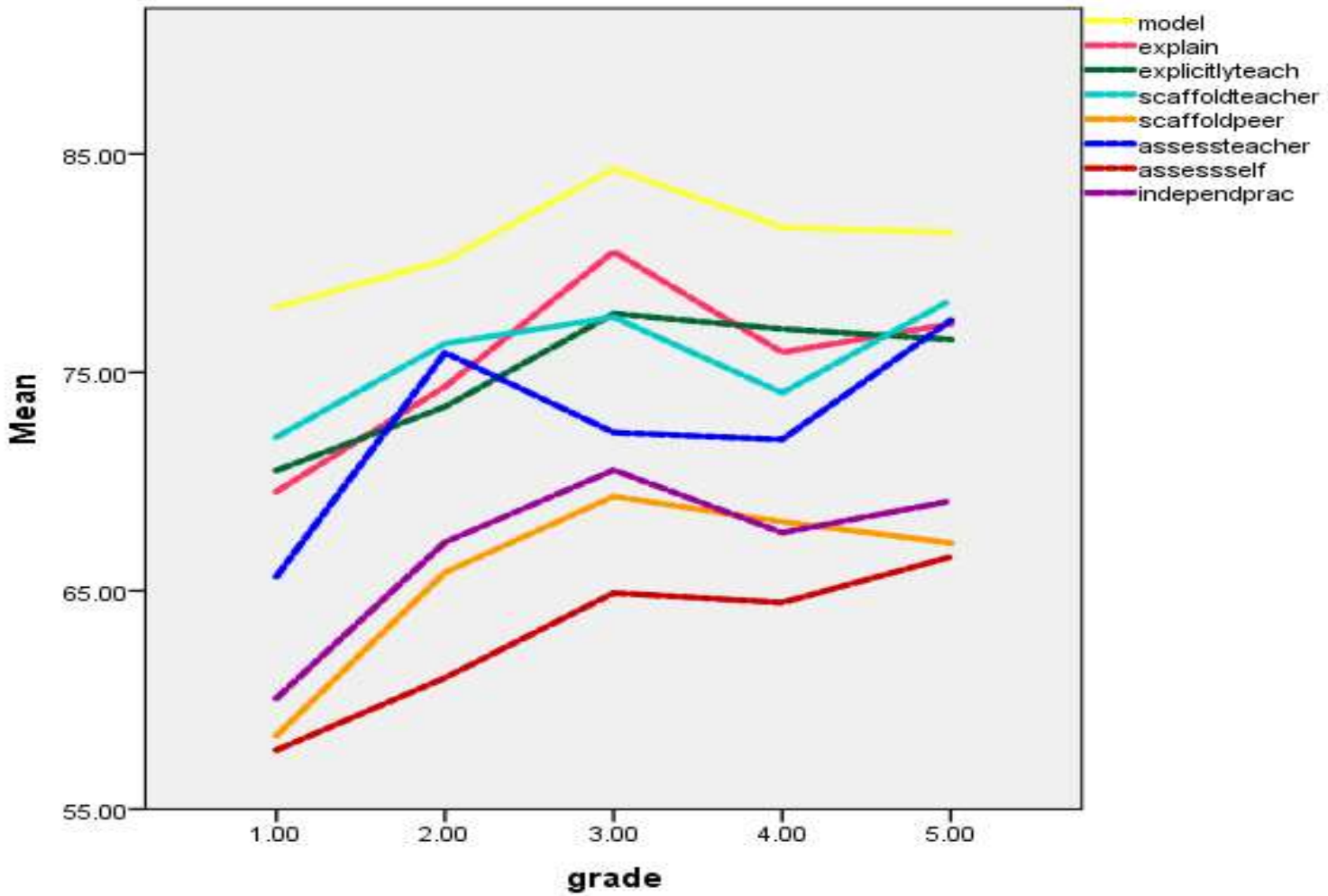

Figure 8. Dimensions of metacognition instruction across elementary grades

CHAPTER 5: CONCLUSIONS and DISCUSSIONS

In this last section of this paper, main findings, significance, and contributions of this study, discussions regarding the main findings, follow-up validation procedures, recommended exploratory research, and educational implications will be presented. Limitations of this study will also be described to improve both validity and utility of the ITMR.

Significance and Contributions of the Study to the Literature

This research study of metacognition instruction is important for its findings, first initiatives in the field, and contributions to the literature. This study was the first initiative to develop a comprehensive literature-based pedagogy of metacognition in reading. By systematically and analytically reviewing both theoretical and empirical documents on metacognition theory, characteristics and capabilities of metacognitive readers, metacognition instruction, social learning theories or principles, and metacognition assessment including the surveys and inventories assessing students' metacognition and the criteria assessing pedagogies of metacognition, the author contributed a PMR to its literature. Constituting a pedagogy of metacognition in reading, seven dimensions were nominated as in the following; fostering students' metacognitive knowledge, adopting goal-directedness, integrating language of thinking, scaffolding students' strategic reading, encouraging students' independence with strategic reading, assessing metacognition, and prolonging metacognition instruction. By the nature of these dimensions, it is assured that teaching metacognition does not require distinctive, significant, or expensive changes in classrooms or with instruction. Rather, by small instructional nuances teachers can help students develop self-awareness, dispositions of thinking, and habits of strategic reading.

Moreover, this research study affords the first initiative to identify classroom metacognition instruction by a psychometrically sound measure. Observable and measurable teacher actions that were described in the pedagogy of metacognition helped to construct a measurement instrument of teaching metacognition in reading (the ITMR). As statistical analyses provided robust evidence for the ITMR's internal consistency and its explaining a great amount of the total variance by a single factor, this study also contributed a psychometrically sound measure of metacognition instruction to its literature. According to the ITMR, classroom metacognition instruction may be identified by the following correlated dimensions; assessing strategic reading, students' demonstration of independent strategic reading, and teachers' and students' scaffolding planning reading and regulating strategies via collaborative practices.

The ITMR can also be used across elementary grades since instructional practices did not show any significant variance at least any two grade levels. That is, teachers' self-reported metacognition instruction practices had a similar pattern across all elementary grades. While modelling, explaining, explicitly teaching, and teacher's scaffolding strategic reading was frequently implemented, students' doing self-assessment was the least frequently implemented practice across all elementary grades. In the following, main findings will be discussed with regards to the representation of metacognition instruction in literature, by the ITMR, and with regards to the dimension of teaching metacognition.

Contrasting Metacognition Instruction: The Literature versus the ITMR

Baker (2017) and Van Keer and Vanderlinde (2010) previously recognized a discrepancy between mainstream- and research-classroom metacognition instruction. This research study also identified such a discrepancy between the literature's and the

ITMR's criteria identifying metacognition instruction. While the literature presents a very broad and comprehensive understanding of and in relation, criteria for metacognition instruction, in mainstream classrooms teaching metacognition was represented by an interesting pattern. This pattern will be discussed in relation to teacher-actions, students' meta-behaviors, and the intersection of these two as in the following.

At elementary school level, teaching metacognition was mostly represented by planning (task and text evaluation) and evaluating (task performance) behaviors. These student meta-behaviors emerged at almost all dimensions of teacher-actions. At this school level, while teachers' presentation actions (except for task and performance evaluation) were hardly recognized, teachers' scaffolding (via cooperative practices) and peers' scaffolding (by metacognitive discussions) mostly focused on planning reading by task or text evaluation and regulation of strategies. However, at these two stages of presentation and scaffolding, metacognition instruction did not identify comprehension monitoring. Furthermore, the most distinctive criteria of classroom metacognition instruction were identified by assessment practices. By assessment practices, all stages of strategic reading were identified for classroom metacognition instruction. In the following, these arguments will be discussed in detail.

With regards to teacher's presentation of metacognition, teachers' modelling, explaining, or explicitly teaching strategic reading was hardly identified by the ITMR. Even if teacher's modeling strategic reading was highly suggested for metacognition instruction and even if it is dominantly utilized to assess pedagogies of metacognition in empirical research, the ITMR did not identify these actions for classroom metacognition instruction. Only teachers' modelling performance evaluation may be used to identify

metacognition instruction in classrooms. Likewise, some other presentation practices such as teaching strategies explicitly and directly (e.g. by *WWW&H rule*) and informing students about the benefits of strategy regulation and comprehension monitoring for task performance are highly suggested for and utilized as standards of teaching metacognition in the literature. However, these practices were not identified by the ITMR as the criteria for classroom metacognition instruction. Rather, teacher's explaining, explicitly teaching, and scaffolding behaviors were only related to task evaluation and task performance evaluations on the ITMR. As can be seen on Figure 8, indeed teachers' modeling, explaining, and explicit teaching was prominent across all grades. For this reason, it cannot be a coincide that these criteria may not be used to identify classroom metacognition instruction.

Teaching metacognition identified by the ITMR also pertains to students' collaborative practices with the teacher (teachers' scaffolding) and students' scaffolding each other (via metacognitive discussions) while they practice planning reading (task and text evaluation) and regulating strategies. Even if the literature criteria of teaching metacognition are vague with regards to students' metacognitive discussions and group practices of strategic reading, these are strongly suggested for or used to assess classroom metacognition practices. The ITMR helped clarify literature's criteria or suggestions with collaborative practices and scaffolding. The ITMR identified planning reading and strategy regulation via teacher's and students' scaffolding for classroom metacognition instruction. However, teachers' helping students with comprehension monitoring or task performance evaluation and students' discussing meaning making and task performance

evaluations with teachers, peers, or by rubrics was not identified by the ITMR even if the literature might potentially propose these to assess metacognition instruction.

The ITMR also identified a note-worthy and thought-provoking aspect of classroom metacognition instruction. Comprehension monitoring was the subtlest facet on the ITMR. It was not recognized via teacher's presentation actions including modeling, explaining, or explicit teaching. In relation, students' practicing comprehension monitoring with teacher's help or discussing it with someone else was not identified. Approaching the criteria of classroom metacognition instruction identified by the ITMR critically, the author had to declare potential influences of the research context on such a pattern. In the specific context of this study, educational standards require students to master foundational reading skills, improve world knowledge, and get familiarized with conventions of language and clarity besides some dimensions of text complexity during their elementary education. Therefore, teachers' presentation of comprehension monitoring and students' collaborative work either with the teacher or peers may be common practices in most classrooms. That is, most teachers might have taught reading strategies, vocabulary, and conventions of language via reading comprehension practices.

Unlike other dimensions and even if hardly suggested for metacognition instruction or utilized as the criteria of teaching metacognition in empirical literature (Appendix F), assessing strategic reading was distinctively identified by the ITMR. That is, classroom metacognition instruction might be identified by teachers' having students demonstrate strategic reading, assessing and then providing feedback on students' strategic reading, and having students self-assess strategic reading. These assessment

practices, in fact, may reveal teachers' goal-directed instructional practices for developing students' dispositions and habits of thinking. Meanwhile, these findings confirm Lai's (2011) earlier arguments; metacognition is not assessed regularly and traditionally at schools. Therefore, the ITMR's identifying all aspects of teachers' assessing and then providing feedback on students' strategic reading as the criteria of teaching metacognition may not be a coincidence.

Moreover, instructional practices that have students self-assess strategic reading may also identify metacognition instruction. As previously argued, self-assessment is a collection of metacognitive capability and it operates on the edge of consciousness (Afflerbach & Meuwissen, 2005). For individual to do self-assessment, they need to plan, adopt and adapt strategies, and monitor their cognitions purposefully to meet task demands. Within the flow of this process, task performance evaluation can mimic self-assessment. However, self-assessment is not limited to performance evaluation, rather it is more inclusive. Self-assessment is a conscious form of evaluation that pertains to every decision made for and during strategic reading. Therefore, it naturally embraces individuals' assessing performance and it also pertains to evaluating the criteria, tools, text and context, and reader-characteristics that influence performance. By these functions, self-assessment definitely supports individuals' metacognition adequacy and agency with strategic reading. Therefore, ITMR's identifying students' self-assessment as the criteria for classroom metacognition instruction corresponds to the nature of metacognitive adequacy. However, even if it bears great potentials to develop and support students' metacognitive adequacy, as seen on Figure 8, students' self-assessment was the least frequently implemented practice at all grades.

In relation to these assessment dimensions, students' demonstration of strategic reading organically emerged as the criteria for classroom metacognition instruction. For teachers to assess students' strategic reading and for students to reflect on their strategic reading, students should demonstrate each stage of their cognitions. The ITMR identified teachers' having students demonstrate task evaluation, text evaluation, comprehension monitoring, and performance evaluation. Indeed, these aspects corresponds to both literature's criteria of metacognition instruction and suggestions voiced for metacognition instruction. Literature consistently recommends teachers' and students' thinking aloud strategic reading or students' demonstrating their strategic reading (sometimes with the help of advanced organizers); the ITMR synchronized these practices as the criteria to identify classroom metacognition instruction.

The criteria of classroom metacognition instruction identified by the ITMR in this study corresponded to the criteria in the literature partially. In the following section, the author will offer possible explanations for this discrepancy between the ITMR and the literature with regards to the congruence of metacognition instruction practices across elementary grades. For this purpose, at first the pattern of metacognition instruction practices at elementary grades will be discussed as in the following.

Contrasting Metacognition Instruction across Elementary Grades

In the previous chapter of this study, it was stated that there were no mean differences in teachers' self-reported metacognition instruction practices across the elementary grades. This finding can enable the ITMR's application across all elementary grades. However, the structure of the ITMR that reflected a subtle presence of teacher's presentation of strategic reading and a distinctive proclivity towards assessment practices proposes that classroom teachers might deliver instruction in certain ways. To explore

this proposition, Figure 8 will be analyzed with regards to empirical research's criteria for metacognition instruction.

As seen on Figure 8, teachers' metacognition instruction practices were dived into two distinct sets. On the top, teachers' dominant instructional practices piled up. This set included presentation practices; modeling, explaining, explicitly teaching, and scaffolding students' strategic reading. All these practices are both highly recommended for and frequently used as the criteria of metacognition instruction by the empirical research (Appendix F). However, the current classroom trend might be the reason that the ITMR hardly captured such presentation practices.

Moreover, teachers' assessment practices could be blending with presentation practices and in fact, informing these practices. Even if assessing students' strategic reading seems to transpose divergently across the grades, it seems that teachers mostly assessed students' metacognition while presenting for strategic reading, helping, or working with students. Also, since presentation practices (e.g. modeling, explaining, and explicitly teaching strategic reading) were strongly and positively correlated to assessment practices, it can be considered that teachers adjusted their instruction to students' metacognition capabilities. However, it is apparent that students were not given enough opportunities to develop agency with strategic reading.

The least frequently implemented practices pertained to students' agency with strategic reading. These set of practices included encouraging students' demonstration of independent strategic reading, students' scaffolding each other especially via metacognitive discussions, and having students do self-assessment. Even if these agency-practices were subtle across all grades, this trend corresponds to the empirical research's

criteria-adoption pattern. This is, metacognitive discussions and self-assessment is the least frequently adopted to assess pedagogies of metacognition or recommended to promote students' metacognition in classrooms. However, regarding Fisher's (1998, 2007) and Hartman's (2001a) arguments about metacognitive discussions or dialogic talks, for students to discuss strategic reading; they had better first self-assess vicarious control and its impacts over reading. As self-assessment is a collective capability of metacognitive knowledge, skills, and mind-sets (Afflerbach & Meuwissen, 2005), it is when students gain confidence, mastery, and independence with strategic reading. Even if classroom practices of metacognition instruction did not propose students' agency with strategic reading much, the beneficiary impacts of self-assessment, metacognitive discussions, or students' demonstrating independent strategic reading cannot be ignored. Therefore, it is not a coincidence that the ITMR distinctively captured all these aspects of the instruction.

By Figure 8 and by contrasting it to the frequently adopted empirical research criteria (Appendix F), it was recognized that classroom metacognition instruction practices identified in this study corresponded to literature's criteria and recommendations.

Assessment: A Possible Lens for Identifying Classroom Metacognition Instruction

Following a systematic and analytic review of literature, this study developed a comprehensive understanding of metacognition instruction as can be seen in earlier sections of this study. However, limited research studies (Bolhuis & Voeten, 2001; Curwen et al., 2010; Duffy, 1993; Fisher, 2002; Kerndl & Aberšek, 2012; Ozturk, 2016; Thomas & Barksdale-ladd, 2000; Zohar, 1999) that examined teachers' pedagogies of

metacognition adopted inconsistent criteria as there was no comprehensive pedagogy of metacognition. Since none of these previous studies used the ITMR's comprehensive criteria thoroughly and since the classroom metacognition instruction trends discussed previously corresponded to empirical research criteria, it may be possible to challenge that teachers lack pedagogies of metacognition. Teachers might show some competencies and adequacies of pedagogies of metacognition only when they are assessed properly.

Specifically, the discrepancy among the classroom metacognition instruction trends, the empirical literature, and the ITMR cannot be ignored when it comes to assessment practices. Considering demanding educational standards, institutional policies, time pressure, curriculum mandates, high stake tests, and teachers' expertise, it may be possible that assessment has not been highly emphasized, frequently used as the criterion, or implemented for metacognition instruction in the literature or in classrooms, respectively. However, the ITMR's criteria highlights the discriminatory importance of assessment (teachers' and students' self-assessment) in developing students' metacognition.

Considering the reciprocal relation between assessment and instruction, it is very legitimate that the ITMR peculiarly identifies assessment criteria to capture classroom metacognition instruction. Teachers can regulate their instructional practices to help students improve metacognition potentials only when they assess students' metacognition adequacy and *needs*. After assessing, teachers who are informed about students' current proficiencies with metacognition can implement a goal-oriented instruction (Ozturk, 2017b). It is when teachers decide whether and how for example, modeling and thinking reading aloud, having students think aloud strategic reading, practice and discuss

strategic reading with peers, and scaffolding strategic reading might help address students' needs with regards to students' characteristics.

Moreover, even if self-assessment is hardly proposed in the literature and implemented in classrooms, it is very legitimate that metacognition instruction may be captured by self-assessment criteria. The purpose of metacognition instruction is to develop students vicarious control over thinking. Metacognitive individuals, as a matter of course, do self-assessment continuously to test their decisions and behaviors for successful reading. However, at this point, there is not enough evidence to argue that the ITMR's criteria is practically efficient. It would be inappropriate to argue that instructional practices on the ITMR can sufficiently promote students' metacognition or such criteria can identify "metacognition instruction experts." For these reasons, in the following the author will present both a validity research plan and limitations of this study; so that, these hypotheses can be studied empirically and sound evidence can be produced.

Implications

Validity research studies. By its findings, this research study initiates a new pathway to study metacognition instruction. However, because of its limitations, the author strongly recommends following a validity-research plan first for the ITMR's validity. Messick (1993) stated that validity is not a property of scores, rather it is an overall judgement of the degree that empirical evidence and theoretical rationale supports the adequacy and appropriateness of interpretations based on test scores (p.6). Messick (1993) also emphasized that scores are a function of items, persons who respond to those items, and the context of the assessment. Therefore, "what needs to be valid is the

meaning or interpretation of the scores as well as any implications" that this meaning entails (Messick, 1993, p.6) .

Considering the extent of current meanings or implications, this research proposes a continuing process to study the ITMR's validity. For this purpose, Messick's (1993, 1994) six distinct aspects of validity will be proposed as a means separating some of the complexities in appraising the appropriateness, meaningfulness, and usefulness of the inferences and for a unified concept of validity. These aspects include content, substantive, structural, generalizability, external, and consequential aspects of construct validity. This study provided sufficient evidence for content, substantive, and structural aspects of the ITMR. By a comprehensive literature review, expert, cognitive, and focus-group interviews, ITMR's content, substantive relevance, and representativeness was ensured. By analyzing the ITMR via EFAs and calculating internal consistency reliability, this study also generated evidence for the structural validity of the ITMR.

This research proposes future studies to examine (1) the generalizability of the ITMR. Especially by improving the limitations that stem from sample recruitment technique, sample's characteristics, and data collection methods in this study, future research should examine the criteria that can possibly represent classroom metacognition instruction to and across different settings, contexts, and groups. Moreover, future research should study (2) the external aspects of the ITMR's validity. The external aspect of validity refers to the ITMR's correlation to other measures or non-assessment behaviors that are implicit in the theory of the construct. For this purpose, this study highly recommends implementing cluster analysis specially to study discriminant or convergent validity of the ITMR. So that, the sources of variation in teaching

metacognition can be identified, if there is at all. Teachers' metacognition instruction might correlate to or show variance regarding some characteristics (differentiation factor) for example, pre-service teacher education program as suggested by the author previously (Ozturk, 2016), teacher's metacognition (e.g. Ozturk, 2017a), level of education (the dominant influence in this study), and school-levels or grades taught. To examine whether differences in any of these factors correlate to or account for a consequential proportion of the total variation in the ITMR, future research initially needs to identify empirically studied or at least explicitly mentioned factors in its literature.

Moreover, future research also needs to examine (3) the ITMR's predictive validity. Such research, in fact, will provide very valuable evidence for its educational implementations. As previously suggested (i.e. Ozturk, 2017a), the relation between teaching metacognition (via the ITMR) and students' metacognition (via by think-aloud, measurement surveys or inventories, and reading performance indicators) needs examination. Indeed, without examining the relation between teachers' pedagogies of metacognition and students' metacognitive competence or adequacy, interpreting ITMR's score on itself can be arbitrary.

It is also important for future research to examine (4) consequential aspect of the ITMR's validity by especially longitudinal (correlation) studies. Messick (1993, 1994) stated that there might be both (a) intended and unintended and (b) short- and long-term consequences of scale interpretations and use. Learning is a process and students' metacognitive development can be constantly guided, scaffolded, modified, and provided with feedback. For this reason, rather than examining metacognition instruction at a time or for short periods and therefore, rather than over- or under-representing or misjudging

teachers' metacognition instruction by that-time's-scores, research needs to interpret long-term evidence for teaching metacognition and in relation to students' metacognition. These studies can both help produce fair interpretations and also contribute to understanding the relation between teaching and learning metacognition better.

A unified validity framework that embraces these interconnected facets of the validity distinguishes (a) the source of justification for and consequences of score valuation and (b) the function (interpretation) and outcome (use) of testing (Messick, 1993). In this study, evidential basis and potential score interpretations facets contributed to its construct validity. However, the ITMR also needs to be examined and validated for its relevance/utility, value implications (consequences), and social consequence by the research previously suggested. Indeed, as Messick (1993) emphasized these facets on a progressive matrix in his conceptual work, this study also proposes that the IMTR's validation is a process building upon previous attempts and evidence.

Exploratory research studies. In addition to progressive validity research, it is important to conduct some descriptive or exploratory research to enrich the understanding of metacognition instruction for educational implications. For this purpose, the author highly recommends future research to conduct interview studies and develop an observation scale of metacognition instruction.

It is important to conduct interview studies with classroom teachers to understand the practicality of the ITMR. To better understand how and why classroom teachers deliver instruction in certain ways for example, why assessment and metacognitive discussions practices are subtle, research needs to examine and voice possible influences

or reasons impacting instruction. By so, the practicality of the ITMR can be discussed better.

Future research can also contribute to a line-of-research of metacognition instruction. In fact, the ITMR constitutes the first phase in identifying classroom metacognition instruction by a psychometrically sound measure. Following the validity research, this study invites initiatives to develop an observation scale of teaching metacognition in reading. To strengthen the interpretations and the utility of the metacognition instruction scale, an observation scale that corresponds to its self-report measure is a must. By so, teachers can get recognition, feedback, and support for their instructional practices.

Finally, with regards to classroom practices and research trends of metacognition instruction, this research suggest an evaluation of teacher education programs. Education policies recently require students to build strong content knowledge and respond to various demands of audiences and tasks in different disciplines by critically synthesizing different resources and valuing sound evidence (Curwen et al., 2010; Ozturk, 2017b). As metacognition can be an efficient tool to achieve such educational standards, limited research with pre-service teachers (e.g. Ozturk, 2016; Thomas & Barksdale-ladd, 2000), however, reported that young teachers did not feel confident with teaching metacognition and they did not apply pedagogies of metacognition to their tutoring. For these reasons, the author recommends an examination of teacher-education programs for its inclusion of metacognition theory and delivery of pedagogies of metacognition. By examining pre-service teachers' competencies with metacognition instruction, necessary improvements

or revisions should be made in teacher-education programs. So that, prospective teachers can help develop or foster students' metacognition in their future classes.

Educational implications. This dissertation study was conducted on the premise of utility of metacognition literature for effective classroom metacognition instruction. As explained in the problem section of this paper, there is a discrepancy between mainstream and research classroom realities with regards to students' metacognition; students in mainstream classrooms are not as proficient with metacognition (Carroll, 2008; Curwen et al., 2010; Van Keer & Vanderlinde, 2010; Veenman, 2013a). Since teachers' need for tools to teach metacognition is still valid (see Duffy, 1993; Kerndl & Aberšek, 2012; Veenman et al., 2006), a PMR and the ITMR can be used to satisfy this need. Teachers can adopt a PMR as a guideline and the ITMR as a rubric and inform their instruction with pedagogies of metacognition.

Moreover, after replication and validity research, the ITMR can be used to initiate change in teachers' professional competence with metacognition instruction. That is, the ITMR can be paired with an observation scale to identify teachers' needs. Rather than labeling teachers' metacognition instruction as incompetent, an analysis of discrepancy between the observation and self-report measures can help detect the aspects that need scaffolding or improvement. By so, rather than exposing teachers to generic modules of metacognition instruction, needs-based professional development modules at local, school, or classroom level can be delivered. As generic professional modules may not always help all teachers with metacognition instruction (Ozturk, 2017a), a needs-based approach is strongly recommended both to celebrate teachers' extant qualifications and also to hinder the barriers against change.

A PMR and the ITMR has great potentials to create a new line of research and contribute to classroom practices (see Table 7); however, as any research, this study has limitations. These will be discussed in the following not to lead any teachers or researchers to any kind of misuse of the ITMR.

Table 7

Suggested future research and educational implications

Initiatives	Method
Validity research studies	
Generalizability validity	Replication studies (with random sampling, inclusive data collection methods, increased sample size, different teacher groups, different settings, and different contexts)
Discriminant/ convergent validity	Cluster or correlation analysis (to identify the factors that might impact teaching metacognition)
Predictive validity	Regression or correlation analysis (for students' metacognition or with performance indicators)
Consequential validity	Longitudinal (correlation) studies (to identify metacognition instruction patterns over time and its correlation to students' metacognition development)
Exploratory research studies	
Influences on instruction	Interview studies with classroom teachers
Metacognition instruction in-action	Scale development (an observation scale of metacognition instruction)
Teacher education	Curriculum/program evaluation (regarding its inclusion of metacognition theory and delivery of metacognition instruction)

Educational implications	
A PMR and the ITMR	Supplementary tools for teachers' metacognition instruction
The ITMR and observation scale	For needs-based professional development units at local, school, or classroom level

Limitations of the Study

This research study developed an extensive literature-based PMR and a scale of teaching metacognition. However, the findings of psychometric properties of the ITMR cannot be generalized to other settings or groups unless characteristics correspond or limitations of this study improve.

Considering the development of the ITMR, there might be some concerns with the cognitive and focus group participants' representativeness of the population. Cognitive and focus group interviewees were familiar with reading education and metacognition literature because all interviewees pursued a graduate degree at the time of interviews. They were at the various stages of their graduate programs ranging from the first semester of the masters to the tenth semester of the doctoral degree. Item wording, therefore, was not problematic for the interview participants. However, for some participant teachers, the items might have been confusing and requested considerable amount of time and energy to interpret. This is because there were two young teachers who commented on the author's research invitation post saying that they may not be familiar with reading terminology. These teachers might have gotten confused by the small nuances in the items. Therefore, by conducting both cognitive and focus-group interviews with classroom teachers who only hold a bachelor's degree, item wording can be revised or improved by the future studies.

Moreover, this study used a non-probability sampling technique (convenience sampling). Following a comparison of descriptive sample statistics and population parameters, it was recognized that sample did not represent the population. In this study, the ITMRs' optimal solution was biased towards female volunteers who teach reading at elementary schools in the USA. Therefore, it is important to be cognizant of this limitation before delivering the ITMR in any research or educational settings. ITMR's use might not be applicable to different settings or with different groups or its interpretation might be misleading in some settings unless researchers run EFA again.

Moreover, data collection mode and instructions presented prior to survey may pose some limitations. For example, collecting data online might have excluded some teachers that might have been included otherwise. Moreover, even if respondent were presented a consent form that informs them about the research, tasks, and their rights, some might have been alerted reading "your responses will not be shared with anybody else including other participants or *your employers*" (emphasis added). Despite ensuring data's confidentiality and anonymity, such a sentence might have influenced some teachers not to take or stop the survey at any point, if they did not over-represent their instructional practices, at all.

Moreover, it is important to acknowledge that all analyses were conducted with imputed and weighted data. Although the missing data were not a problem in this study and linear regression was used to impute the data and although poststratification was used to confront the population parameters, there is still a slight possibility that the findings might be different when the data are complete or when the participants are randomly recruited.

For these limitations, it is important to replicate the second part of this study and examine the ITMR and mean differences again. By collecting data from a more representative sample especially by employing random sampling technique, using both hardcopies and softcopies of the survey to collect data from classroom teachers, and expanding the data collection period, the ITMR and the congruence of metacognition instruction across the grades should be examined for saturation.

Concluding Remarks

This study was a humble endeavor to explore the realities that matter to me. To frame and examine classroom metacognition instruction, I utilized my positions as a researcher and a teacher. Analyzing and synthesizing numerous theoretical and empirical documents, I appreciate all previous works' and in relation, researchers' and philosophers' contributions to this study. By this study, I appreciate every act that flourishes individual's potentials and agency to think systematically rather than accepting routines. I appreciate every act that cultivates the fundamentals of meaningful learning rather than standardizing it. I appreciate every act that contributes to liberating the mind rather than extinguishing its beauty.

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Appendix A

Table A1

Trends in assessing teachers' pedagogies of metacognition

Teacher-behavior assessed for metacognition instruction	Frequency
Modelling & thinking aloud a cognitive act	10
Explicit teaching of metacognition strategies or thinking skills	7
Teaching students why to use strategies/ telling the value of being strategic	5
Engaging students in metacognitive discussions	5
Encouraging students' demonstration of strategy-use	3
Teaching students how to use strategies	3
Providing students with feedback on their thinking	3
Facilitating students' reflective thinking or reasoning	3
Providing students with scaffolding for their cognitive engagement	2
Enabling students' self-evaluation	2
Teaching students when to use strategies	2
Encouraging students to share their cognitions	2
Promoting peer collaboration	2
Listening to students' plans for task demands	1
Creating opportunities for students' strategy-choices	1
Providing students with guidance to approach tasks	1
Helping students discover their strengths and identify weaknesses	1
Assessing students' understanding of metacognition	1

Note. This table was developed by the analysis of 11 available studies on teachers' pedagogies of metacognition

Appendix B

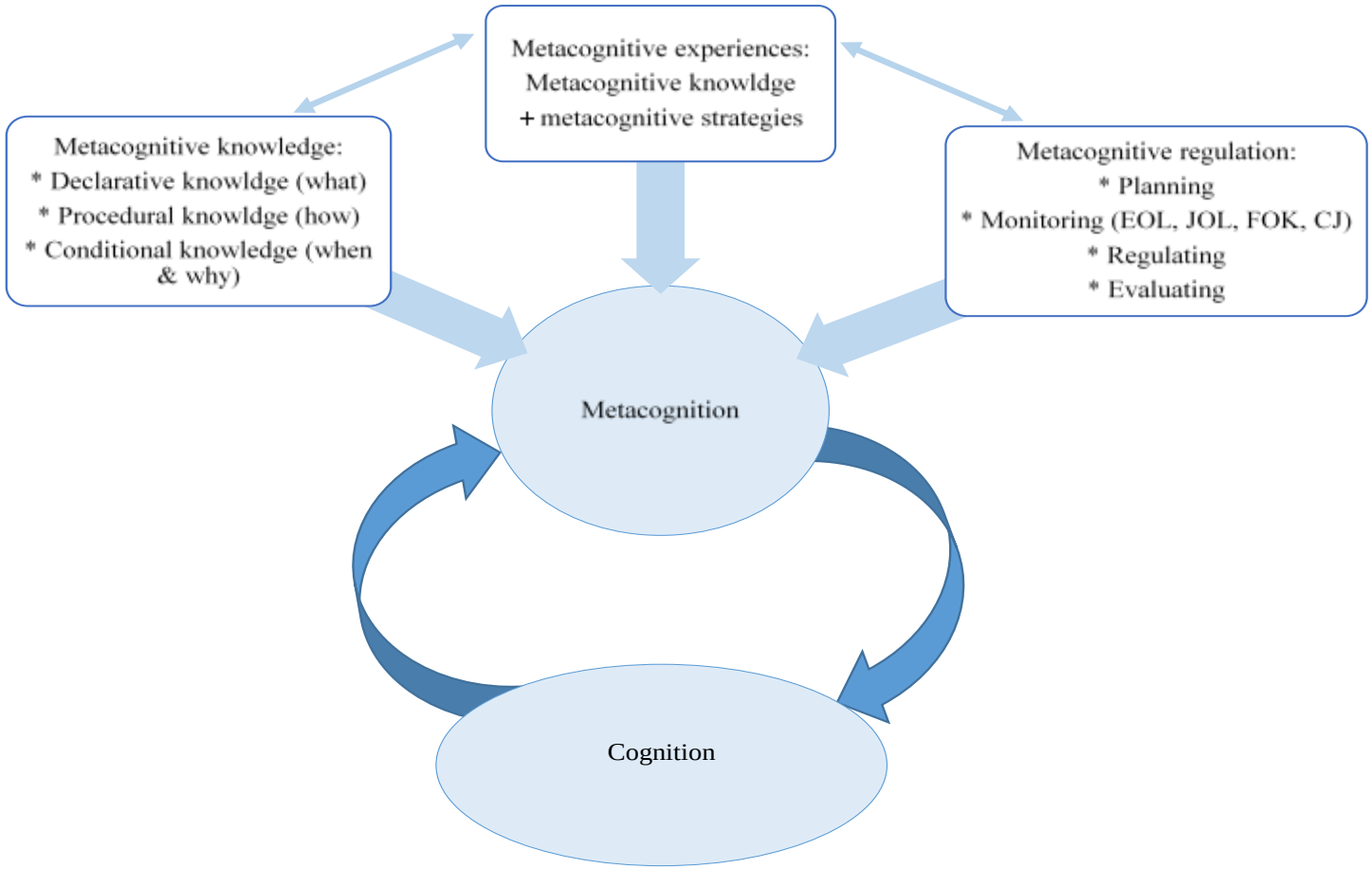

Figure A1. A visual representation of metacognition theory

Appendix C

Table A2

Characteristics and capabilities of metacognitive readers

Characteristics	
	Metacognitive readers ✓ know about reading and how reading is accomplished ✓ have a sense of meaningfulness of reading ✓ see knowledge as a set of concepts rather than isolated facts ✓ understand meanings and relationships presented in texts ✓ understand strategic and meaning-oriented reading ✓ think comprehension is satisfying and productive ✓ know about text features and structures ✓ identify different task requirements ✓ engage in thoughtful and adaptive reasoning ✓ are selectively attentive to reading ✓ know about and use a variety of metacognitive and cognitive reading strategies ✓ do self-questioning and self-assessment ✓ transfer skills to new task situations purposefully and efficiently ✓ are aware of their characteristics as readers ✓ know about their weaknesses and strengths ✓ are aware of their reading purposes
Capabilities	
	Before reading, metacognitive readers ✓ set a purpose to read ✓ activate relevant prior knowledge ✓ preview the text context and structure ✓ preview task demands

- ✓ set standards of successful reading
- ✓ make some predictions
- ✓ determine most useful strategies
- ✓ allocate resources (time & instructional aids)

While reading, metacognitive readers

- ✓ monitor comprehension
- ✓ reconstruct comprehension
- ✓ adjust rate of reading
- ✓ adjust level of cognitive processing
- ✓ adjust standards of comprehension building
- ✓ coordinate, modify, and shift reading strategies when necessary
- ✓ selectively and continually make decisions
- ✓ check predictions and inferences
- ✓ check the alignment between text content and prior knowledge
- ✓ paraphrase and summarize understanding
- ✓ relate text to earlier experiences
- ✓ construct images for comprehension
- ✓ identify categories of information
- ✓ anticipate test questions
- ✓ do self-questioning
- ✓ generate and use their own feedback

After reading, metacognitive readers

- ✓ assess their comprehension
- ✓ evaluate goal-achievement/ task performance
- ✓ evaluate strategy use
- ✓ react to the text intellectually
- ✓ think about future uses of new knowledge
- ✓ assimilate or associate new knowledge
- ✓ transfer strategies for future performances

Appendix D

Table A3

Focus of metacognition assessment in the domain of reading

Component	Focus	Manifestations
Metacognitive knowledge	Knowledge about strategies, self, text, and task	Through metacognitive experiences
Metacognitive strategies	Planning	Predicting, previewing, purpose setting, activating prior knowledge, allocating personal resources and time, checking text content, checking text content whether it fits the goal, skimming for text structure, visualizing, setting standards for successful reading, determining initial set of strategies for meaning making
	Monitoring &Regulating	Self-questioning, verifying and adjusting predictions, making inferences, applying fix-up strategies, modifying strategies, summarizing at certain intervals, visualizing, understanding new words in context, using personal resources and time purposefully, recalling main idea, using context clues and text structure, rereading, reading slow, reading aloud, self-correcting, focusing attention, reflecting on main idea,

		checking understanding for conflicting ideas, developing test questions, checking the alignment between text content and prior knowledge, relating text to experiences, identifying categories of information, discussing main idea with others, checking structural and propositional cohesiveness, checking author's ideas for consistency, appealing for help, taking notes, underlining, paraphrasing, generating and using self-feedback
	Evaluating	Self-assessment of comprehension and strategy use, summarizing, recalling and reflecting on main idea, tying text to life experiences and previous learning, discussing main idea with self and others, thinking future uses of new information, evaluating structural and propositional cohesiveness, evaluating text's value, evaluating author's ideas, evaluating one's task performance
	Reasoning	Explaining thinking for actions, strategy selection and use, and comprehension

Appendix E

The reciprocity between metacognitive and cognitive strategies

	Planning	***Monitoring***	***Regulating Strategies***	***Evaluating***
When	Before I read …….....	While I am reading	While I am reading ……	While reading, I evaluate my comprehension
	…….	……..……	……..……	After reading, I evaluate my strategy use
	…….	……..……	……	
	…….	……. …..	……	After reading, I evaluate my understanding of the text
	…….	…….	……	
	…….....	…….....	……	After reading, I evaluate my task performance
How	I set my reading goal I analyze task demands I check if I know anything about the topic I make some predictions ……..... ……..... ……... ……...	I check if the text is making sense to me I ask questions to myself I check my inferences I check if the text resonates with what I know …… …… ……	If a reading strategy helps me to understand the text, I continue to use it If I cannot understand a part, I reread it If I do not know vocabulary items, I use a dictionary …… ……	I compare my understanding to task demands I check if I can summarize the text I check if I my understanding helps with my task performance …… …… ……
Why	I want to monitor my comprehension I want to make sure my efforts will help meet my reading goal I want to meet task demands successfully ……..	To ensure I am understanding the text To keep track of my reading goal ……..……. ……...…… ……..……..... ……..	To improve my understanding of the text To meet my reading goal …… …… …… ……	To learn from the text To improve my reading abilities To meet my reading goals To complete the task successfully ……. ……. …….

Appendix F

Table A4

Categorization of empirical research: Metacognition instruction

Instructional practices	References
Informed or explicit training of strategies (e.g. WWW&H rule)	(Anderson, 1992; Bolhuis & Voeten, 2001; Book, Duffy, Roehler, Meloth, & Vavrus, 1985; Casteel, Isom, & Jordan, 2000; Çer & Şahin, 2016; Collins, Brown, & Holum, 1991; Cubukcu, 2008; Curwen, Miller, White-Smith, & Calfee, 2010; Duffy, 1993; Duffy et al., 1986, 1987; Duffy, Roehler, & Herrmann, 1988; Duke & Pearson, 2008; Gourgey, 1998; Jacobs & Paris, 1987; Klingner, Vaughn, Arguelles, Hughes, & Leftwich, 2004; Klingner & Vaughn, 1998; Klingner, Vaughn, & Schumm, 1998; Kurtz, Schneider, Carr, Borkowski, & Rellinger, 1990; Michalsky, Mevarech, & Haibi, 2009; Ozturk, 2016; Palinscar & Brown, 1984; Paris, Cross, & Lipson, 1984; Paris, Wixson, & Palincsar, 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Perry, Hutchinson, & Thauberger, 2008; Pressley et al., 1992; Rieser et al., 2016; Van Keer & Vanderlinde, 2010; Varga, 2016; Vaughn & Klingner, 1999; Vaughn, Klingner, & Bryant, 2001; Zohar, 1999)
Teachers' modeling or thinking aloud strategic reading	(Anderson, 1992; Book et al., 1985; Casteel et al., 2000; Collins et al., 1991; Cubukcu, 2008; Curwen, Miller, White-Smith, & Calfee, 2010; Duffy, 1993; Duffy et al., 1986, 1987, 1988; Duke & Pearson, 2008; Fisher, 2002; Gourgey, 1998; Jacobs & Paris, 1987; Klingner et al., 2004; Klingner & Vaughn, 1998; Klingner et al., 1998; Michalsky et al., 2009; Ozturk, 2016; Palinscar & Brown, 1984; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Perry, Hutchinson, & Thauberger, 2008; Pressley et al., 1992; Rieser et al., 2016; Thomas & Barksdale-ladd, 2000; Van Keer & Vanderlinde, 2010; Vaughn & Klingner, 1999; Vaughn et al., 2001; Wilson & Bai, 2010; Zohar, 1999)

Students' demonstration or thinking aloud strategic reading	(Anderson, 1992; Bolhuis & Voeten, 2001; Casteel et al., 2000; Collins et al., 1991; Duke & Pearson, 2008; Gourgey, 1998; Jacobs & Paris, 1987; Klingner et al., 2004; Klingner & Vaughn, 1998; Klingner et al., 1998; Palinscar & Brown, 1984; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Pressley et al., 1992; Thomas & Barksdale-ladd, 2000; Varga, 2016; Vaughn & Klingner, 1999; Vaughn et al., 2001; Wilson & Bai, 2010)
Use of instructional aids	(Anderson, 1992; Book et al., 1985; Casteel et al., 2000; Collins et al., 1991; Curwen et al., 2010; Duffy et al., 1986, 1987, 1988; Jacobs & Paris, 1987; Klingner et al., 2004; Klingner & Vaughn, 1998; Klingner et al., 1998; Michalsky et al., 2009; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Pressley et al., 1992; Rieser et al., 2016; Vaughn et al., 2001)
Cooperative practices	(Anderson, 1992; Casteel et al., 2000; Collins et al., 1991; Duffy et al., 1986, 1987, 1988; Jacobs & Paris, 1987; Klingner & Vaughn, 1998; Klingner et al., 1998; Michalsky et al., 2009; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Pressley et al., 1992; Van Keer & Vanderlinde, 2010; Vaughn et al., 2001; Wilson & Bai, 2010)
Scaffolding	(Anderson, 1992; Bolhuis & Voeten, 2001; Book et al., 1985; Casteel et al., 2000; Çer & Şahin, 2016; Collins et al., 1991; Cubukcu, 2008; Duffy et al., 1988; Duffy, 1993; Duffy et al., 1986, 1987; Duke & Pearson, 2008; Gourgey, 1998; Jacobs & Paris, 1987; Klingner et al., 2004; Klingner & Vaughn, 1998; Klingner et al., 1998; Michalsky et al., 2009; Ozturk, 2016; Palinscar & Brown, 1984; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Perry et al., 2008; Pressley et al., 1992; Rieser et al., 2016; Van Keer & Vanderlinde, 2010; Varga, 2016; Vaughn & Klingner, 1999; Vaughn et al., 2001; Wilson & Bai, 2010)

Metacognitive discussions	(Anderson, 1992; Casteel et al., 2000; Collins et al., 1991; Curwen et al., 2010; Jacobs & Paris, 1987; Klingner et al., 2004; Klingner & Vaughn, 1998; Klingner et al., 1998; Paris et al., 1984; Paris et al., 1986; Paris & Jacobs, 1984; Paris & Winograd, 1990; Perry et al., 2008; Pressley et al., 1992; Thomas & Barksdale-ladd, 2000; Van Keer & Vanderlinde, 2010; Varga, 2016; Vaughn et al., 2001; Wilson & Bai, 2010; Zohar, 1999)
Assessment (teacher or self-assessment)	(Bolhuis & Voeten, 2001; Çer & Şahin, 2016; Cubukcu, 2008; Kerndl & Aberšek, 2012; Ozturk, 2016; Perry et al., 2008)

Note. All metacognition training studies aimed to develop students' metacognition for improved reading performance or learning.

Appendix G

Table A5

A pedagogy of metacognition in reading

Dimensions	Focus	Typical instruction
Fostering students' metacognitive knowledge	Knowledge about reading, thinking, self as a reader, text properties, and task demands.	Teacher's explanation of the nature of reading and the necessity of thinking about the text; teacher's explicit teaching of strategies via the *WWW&H* rule; teacher's explanation and visualization of the reciprocity between metacognitive and cognitive strategies; teacher's explanation of the individualized approaches to reading; teacher's modeling strategic reading via think aloud or by using graphic organizers of strategy matrixes; teacher's demonstration of impacts of thinking about the text on strategy choice and use, comprehension, and reading-tasks; teacher's modeling problem-solving during reading; holding metacognitive discussions with students
Adopting goal-directedness	Goals for reading, strategy use, and strategy learning	Explaining and discussing various purposes to read; explaining the virtue of goal-setting for reading; helping students think about and communicate their reading purposes; explaining and discussing the virtue of goal-

		directed strategy-use; explaining and discussing the virtue of learning strategies
Integrating language of thinking	An advanced-set-of-vocabulary for talking about thinking	Teacher's use of language of thinking; teaching students the vocabulary that help verbalize thought processes; having students use language of thinking
Scaffolding students' strategic reading	Students' metacognitive experiences under guidance or with the help of a more competent partner	Teacher's sharing strategic reading responsibility with students; supporting students' strategic reading by instructional aids such as metaphors and analogies, graphic organizers, reading action plans, thinking maps or rubrics; students' demonstration of strategic reading via for example, think-aloud; students' collaborative practices of strategic reading and metacognitive discussions with classmates.
Encouraging students' independence with strategic reading	Students' independent practices of strategic reading in purist of authentic tasks	Students' independence in planning reading, monitoring comprehension and managing comprehension failures, evaluating comprehension, goal-attainment, task performance, and strategy use for austenitic tasks; students' independent reflections on weaknesses, strengths, and reasons of reading difficulties; students' reflecting upon their thinking about reading;

		teacher's providing constructive feedback on students' independent experiences of strategic reading and scaffolding, if necessary at all.
Assessing metacognition	Assessing students' metacognition; informing and improving instruction; students' self-assessment of metacognition	Utilization of concurrent and retrospective think aloud; metacognitive discussions with students; metacognition assessment inventories or surveys; encouraging students' self-assessment; informing instruction by assessment results
Prolonging metacognition training	Implementing metacognition instruction for prolonged periods	Students' enriched experiences with metacognition: doing it repeatedly, over long-periods of time, and with different texts

Appendix H

Table A6

Table of specification: the initial ITMR

TEACHER ACTIONS	**STUDENT META-BEHAVIORS**				
	Task Evaluation	**Text Evaluation**	**Strategy Selection**	**Real-time Monitoring**	**Performance Evaluation**
Model	How I interpret what the task requires of me as a reader	How I examine the text (e.g., topic, structure, or genre) before reading	How I select appropriate reading strategies for the reading task	How I monitor my text understanding during reading	How I evaluate my task performance
Explain	Why task evaluation is important for task performance	Why text evaluation (e.g., topic, structure, or genre) before reading is important for task performance	Why selecting appropriate reading strategies is important for task performance	Why monitoring text understanding during reading is important for task performance	Why evaluating task performance is important
Explicitly Teach	Students how to evaluate the task they are given	Students how to evaluate the text (e.g. topic, structure, or genre) before reading	Students how to select appropriate reading strategies for the reading task	Students how to monitor their text understanding during reading	Students how to evaluate their task performance
Scaffolding (Teacher's cooperation with students)	Help students while they are evaluating the task they are given	Help students while they are evaluating the text (e.g., topic,	Help students while they are selecting appropriate reading	Help students while they are monitoring their	Help students while they are evaluating their task performance

		structure, or genre) before reading	strategies for the reading task	text understanding during reading	
Scaffolding (Students' Metacognitive Discussions)	Have students discuss their task evaluations	Have students discuss their text evaluations (e.g., topic, structure, or genre) before reading	Have students discuss their strategies selection for the reading task	Have students discuss their monitoring text understanding during reading	Have students discuss their task performance evaluations
Assess (Teacher)	Provide feedback on students' task evaluations	Provide feedback on students' text evaluations (e.g., topic, structure, or genre) before reading	Provide feedback on students' strategy selections for the reading task	Provide feedback on students' monitoring text understanding during reading	Provide feedback on students' task performance evaluations
Assess (Self)	Have students assess their own task evaluation	Have students assess their own text evaluation (e.g., topic, structure, or genre) before reading	Have students assess their own strategy selection for the reading task	Have students assess their own monitoring text understanding during reading	Have students assess their own task performance
Encourage Independent Performance	Have students demonstrate their independent task evaluations	Have students demonstrate their independent text evaluations (e.g., topic, structure, or genre) before reading	Have students demonstrate their independent strategy selection for the reading task	Have students demonstrate their independent monitoring text understanding during reading	Have students demonstrate their independent task performance evaluations

Appendix I

The initial 40-item ITMR

Dear Valued Colleague

Thank you for taking the time to participate in this doctoral research study that is conducted by Nesrin Ozturk under the supervision of Professor Peter Afflerbach and Professor John O'Flahavan at University of Maryland, College Park. By the following questionnaire, we aim to develop a survey of metacognition instruction in reading.

In the following, you will rate statements **as you consider your typical teaching practices**. The statements are accompanied by a scale that ranges from *Not at All Like Me* to *Exactly Like Me*. **There is no correct or wrong answer**. **These statements do not assess or evaluate your teaching.** Your responses to these statements will only be used to identify the most valuable items for the survey that this study aims to develop. It is important you respond to each statement appropriately.

There is no risk from participating in this research study. This research does not ask you to give any kind of personal information to identify you later. **Your responses will remain anonymous and confidential. Your responses will not be shared with anyone else including other participants or your employers.** Only the researcher has access to the data set. The data will be stored on a password-protected computer in a password-protected folder as a password-protected spreadsheet.

Completion of the following questionnaire takes approximately 8-12 minutes. Your participation in this research is completely voluntary. If you decide to participate in this research, you may subsequently withdraw from the study at any time without penalty or consequences of any kind. By continuing with this questionnaire, you indicate that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You may print a copy of this consent form for your own records if you wish.

This study has been approved by University of Maryland, Institutional Review Board. Should you have any questions, concerns, complaints, or should you want to report an inquiry related to this research, please contact the IRB office (email: irb@umd.edu; tel: 301 405 0678) or the researcher (nozturk@umd.edu).

Thank you so much for your time and for your contributions to this study.

Please answer the following questions

Which grade are you teaching/tutoring during the 2016-2017 academic year?

**If you are not teaching during the 2016-2017 academic year, how long have you been out of the classroom?

Which state are you currently teaching/tutoring?

How long have you been teaching/tutoring professionally? (in years)

What is your highest completed level of education?

- ❍ Bachelor (1)
- ❍ Master (2)
- ❍ Doctoral (3)

What is your gender?

- o Female
- o Male

Please rate the following statements regarding your typical teaching practices in reading/language arts classes.

Not at All Like Me **Exactly Like Me**

0 10 20 30 40 50 60 70 80 90 100

1. I model how I interpret what the task requires of me as a reader.

2. I explain why text evaluation (e.g., topic, structure, or genre) before reading is important for task performance.

3. I explicitly teach students how to select appropriate reading strategies for the reading task.

4. I help students while they are monitoring their text understanding during reading.

5. I have students discuss their task performance evaluations.

6. I provide feedback on students' task evaluations.

7. I have students assess their own text evaluation (e.g., topic, structure, or genre) before reading.

8. I have students demonstrate their independent strategy selection for the reading task.

9. I model how I examine the text (e.g., topic, structure, or genre) before reading.

10. I explain why selecting appropriate reading strategies is important for task performance.

11. I explicitly teach students how to monitor their text understanding during reading.

12. I help students while they are evaluating their task performance.

13. I have students discuss their task evaluations.

14. I provide feedback on students' text evaluations (e.g., topic, structure, or genre) before reading.

15. I have students assess their own strategy selection for the reading task.

16. I have students demonstrate their independent monitoring text understanding during reading.

17. I model how I select appropriate reading strategies for the reading task.

18. I explain why monitoring text understanding during reading is important for task performance.

19. I explicitly teach students how to evaluate their task performance.

20. I help students while they are evaluating the task they are given.

21. I have students discuss their text evaluations (e.g., topic, structure, or genre) before reading.

22. I provide feedback on students' strategy selections for the reading task.

23. I have students assess their own monitoring text understanding during reading.

24. I have students demonstrate their independent task performance evaluations.

25. I model how I monitor my text understanding during reading.

26. I explain why evaluating task performance is important.

27. I explicitly teach students how to evaluate the task they are given.

28. I help students while they are evaluating the text (e.g., topic, structure, or genre) before reading.

29. I have students discuss their strategies selection for the reading task.

30. I provide feedback on students' monitoring text understanding during reading.

31. I have students assess their own task performance.

32. I have students demonstrate their independent task evaluations.

33. I model how I evaluate my task performance.

34. I explain why task evaluation is important for task performance.

35. I explicitly teach students how to evaluate the text (e.g. topic, structure, or genre) before reading.

36. I help students while they are selecting appropriate reading strategies for the reading task.

37. I have students discuss their monitoring text understanding during reading.

38. I provide feedback on students' task performance evaluations.

39. I have students assess their own task evaluation.

40. I have students demonstrate their independent text evaluations (e.g., topic, structure, or genre) before reading.

Thank you very much for your contributions to this doctoral research study.

Your sharing the survey (link) with colleagues who teach reading or language arts at elementary or middle-schools will also contribute to this study. We appreciate your support.

Lastly, should you want to get the executive summary and the ITMR when the study is over, please put your email address in the box below. **Email addresses are not linked to responses.**

Appendix J

List of academic and social networks utilized for participant recruitment

Academic Networks

- Author's colleagues in the USA
- Author's professors in the USA
- International Literacy Association
- Literacy Research Association
- The Reading Teacher
- Journal of Adolescence and Adult Literacy

Social Networks

- *Facebook*

Tagging in-field facebook friends with my research-invitation post, Reading Recovery Teachers, The Reading teacher, Journal of Adolescence and Adult Literacy, UMD TLPL, Weareteachershelpline, Third grade teacher gap group, ELA Elementary Collaboration Group, Maryland teacher network, Badass Teacher Association, BATs ELA, BATs Teaching Middle school, Ohio BATs, Spectacular second grade, 2ndaryELA, Year ¾ teachers, Seesaw teachers, Primary teacher resources, ideas, AREA Division C, Literacy Research Association- Doctoral Students Innovative Community Group, Awesome Teacher Resources and Support, 6^{th}-9^{th} Grade ELA support, Teacher pay teacher social market, Supporting children's Literacy, Texas Kindergarten and First grade Teachers, Teach 4 the Heart's Christian Teachers' Lounge, Talented and Treasured Teachers, Teachers for Dyslexia-the Structured Literacy/OG classroom, Iteachfourth, Relief Teaching Ideas Community, Word Work Ideas for K-2 Teachers, First Grade teachers, Teaching Teens: Reading,Writing, & Technology for Diverse Learners, Reading and Writing Lessons, Teach for America Prism, Long Island Teacher Talk/Resources/Job postings, DFW Teachers' Lounge, Middle School Teachers of Reading Workshop, Literacy

Teacher Book Club, Teacher to teacher connection, Primary Teachers For Primary Resources, Twinkl TA, The educator's book club, Breakout edu English, Breakout edu Elementary, Easy Teaching Tools Primary Teachers, Breakout EDU (General Discussion), Teachers Helping Teachers Grow, Teachers helping teachers, Teachers Helping Teachers, Teachers reignited, ELA teacher book club, The Assembly on Literature for Adolescents of NCTE (ALAN), Middle School ELA Chat, 6th grade ELA teachers, LiteracyTeachersDFW: Reading and Writing Across Content Areas

- *LinkedIn*

Elementary group for teachers, Teachers' Lounge, Reading Specialists and Reading Coaches, Education Strategies for Parents, Teachers, Educators and School Staff

- *Twitter*

#TCRWP #FPLiteracy #metacognition #teachmeread #readingteacher #teachingmiddle #teachingliteracy #teachingreading #teacherspeakout #publicschoolsuccess #lovepublicschool #readingresearch #literacyresearch #reading #teachingelementary #ELA @LRA @_NOzturk_

Appendix K

Table A7

State-wise distribution of elementary school teachers

Which state are you currently teaching/tutoring?

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	AK	2	.9	.9	.9
		AL	4	1.9	1.9	2.8
		AZ	3	1.4	1.4	4.3
		CA	18	8.5	8.5	12.8
		CO	2	.9	.9	13.7
		CT	5	2.4	2.4	16.1
		DC	1	.5	.5	16.6
		DE	1	.5	.5	17.1
		FL	10	4.7	4.7	21.8
		GA	3	1.4	1.4	23.2
		HI	1	.5	.5	23.7
		IA	2	.9	.9	24.6
		ID	1	.5	.5	25.1
		IL	11	5.2	5.2	30.3
		IN	4	1.9	1.9	32.2
		KS	3	1.4	1.4	33.6
		KY	1	.5	.5	34.1
		LA	2	.9	.9	35.1
		MA	7	3.3	3.3	38.4
		MD	13	6.2	6.2	44.5
		ME	1	.5	.5	45.0
		MI	6	2.8	2.8	47.9
		MN	4	1.9	1.9	49.8
		MO	5	2.4	2.4	52.1
		NC	4	1.9	1.9	54.0
		NE	2	.9	.9	55.0
		NH	1	.5	.5	55.5
		NJ	8	3.8	3.8	59.2
		NM	1	.5	.5	59.7
		NV	2	.9	.9	60.7
		NY	18	8.5	8.5	69.2
		OH	11	5.2	5.2	74.4
		PA	7	3.3	3.3	77.7
		SC	4	1.9	1.9	79.6
		TN	6	2.8	2.8	82.5
		TX	22	10.4	10.4	92.9
		UK	1	.5	.5	93.4
		VA	2	.9	.9	94.3
		WA	4	1.9	1.9	96.2
		WI	3	1.4	1.4	97.6
		WV	3	1.4	1.4	99.1
		WY	2	.9	.9	100.0
		Total	211	100.0	100.0	

Appendix L

Table A8

State-wise distribution of middle-school teachers

Which state are you currently teaching/tutoring?

Imputation Number			Frequency	Percent	Valid Percent	Cumulative Percent
Original data	Valid	AK	1	1.4	1.4	1.4
		CA	2	2.9	2.9	4.3
		CO	1	1.4	1.4	5.7
		CT	2	2.9	2.9	8.6
		DE	1	1.4	1.4	10.0
		FL	6	8.6	8.6	18.6
		GA	3	4.3	4.3	22.9
		HI	1	1.4	1.4	24.3
		IA	1	1.4	1.4	25.7
		IL	3	4.3	4.3	30.0
		IN	3	4.3	4.3	34.3
		KS	1	1.4	1.4	35.7
		KY	1	1.4	1.4	37.1
		MA	1	1.4	1.4	38.6
		MD	4	5.7	5.7	44.3
		MI	5	7.1	7.1	51.4
		MN	3	4.3	4.3	55.7
		MO	1	1.4	1.4	57.1
		NC	1	1.4	1.4	58.6
		NE	3	4.3	4.3	62.9
		NY	5	7.1	7.1	70.0
		OH	2	2.9	2.9	72.9
		OR	2	2.9	2.9	75.7
		PA	2	2.9	2.9	78.6
		SC	2	2.9	2.9	81.4
		TX	8	11.4	11.4	92.9
		VA	2	2.9	2.9	95.7
		WI	3	4.3	4.3	100.0
		Total	70	100.0	100.0	

Appendix M

Table A9

Missing data analysis

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes[a]	
				Count	Percent	Low	High
A1_1	211	85.5498	13.24175	0	.0	8	0
A2_1	211	78.4360	20.18838	0	.0	2	0
A3_1	211	78.6066	24.17184	0	.0	9	0
A4_1	211	83.3839	21.80824	0	.0	10	0
A5_1	209	61.7703	27.44356	2	.9	0	0
A6_1	210	77.6286	23.92822	1	.5	13	0
A7_1	206	56.6505	28.40516	5	2.4	0	0
A8_1	207	68.4396	25.08519	4	1.9	0	0
A9_1	211	82.0095	21.41139	0	.0	9	0
A10_1	209	80.8421	21.76092	2	.9	12	0
A11_1	211	83.5735	19.80520	0	.0	6	0
A12_1	209	72.7321	24.73892	2	.9	5	0
A13_1	205	63.8683	27.90156	6	2.8	0	0
A14_1	206	65.9854	26.83617	5	2.4	0	0
A15_1	206	61.1311	26.32957	5	2.4	0	0
A16_1	211	72.4455	24.97905	0	.0	0	0
A17_1	211	83.1232	19.57583	0	.0	7	0
A18_1	210	83.0667	19.72794	1	.5	11	0
A19_1	208	67.1154	28.03494	3	1.4	0	0
A20_1	210	74.5333	23.89373	1	.5	4	0
A21_1	208	65.7596	27.14427	3	1.4	0	0
A22_1	211	72.3981	24.40536	0	.0	0	0
A23_1	210	71.7476	24.93011	1	.5	0	0
A24_1	210	67.3286	26.77251	1	.5	0	0
A25_1	208	84.9904	18.06349	3	1.4	10	0
A26_1	208	72.4375	26.46456	3	1.4	0	0
A27_1	210	72.8143	25.44736	1	.5	0	0
A28_1	207	72.9517	24.59019	4	1.9	1	0
A29_1	206	67.5049	25.99658	5	2.4	0	0
A30_1	205	76.3415	22.51885	6	2.8	6	0
A31_1	203	67.1823	26.15304	8	3.8	0	0
A32_1	203	66.4926	26.84118	8	3.8	0	0
A33_1	203	74.3202	25.27416	8	3.8	0	0
A34_1	202	69.9010	26.63593	9	4.3	0	0
A35_1	206	77.3738	24.08544	5	2.4	10	0
A36_1	205	77.3220	22.23171	6	2.8	7	0
A37_1	205	74.4732	22.76404	6	2.8	3	0
A38_1	206	73.4515	26.66806	5	2.4	5	0
A39_1	202	63.1287	28.77072	9	4.3	0	0
A40_1	201	65.1891	27.12700	10	4.7	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

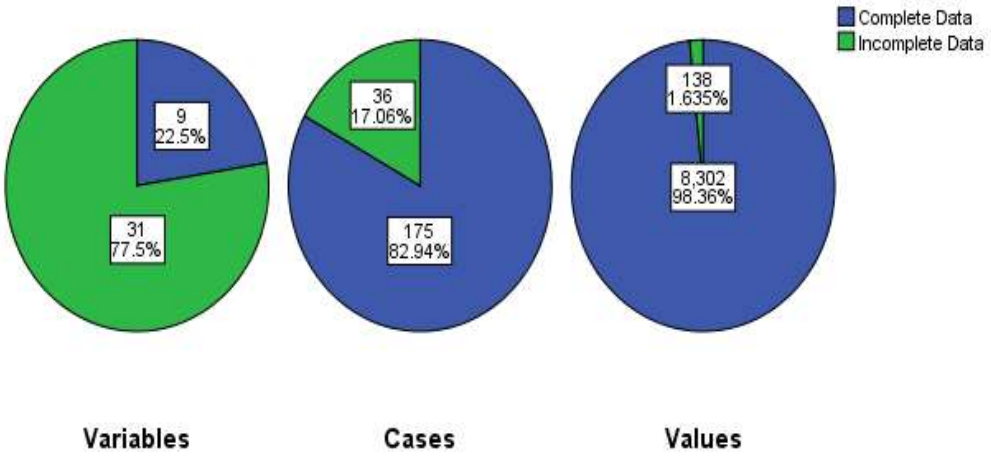

Figure A2. Missing data trends

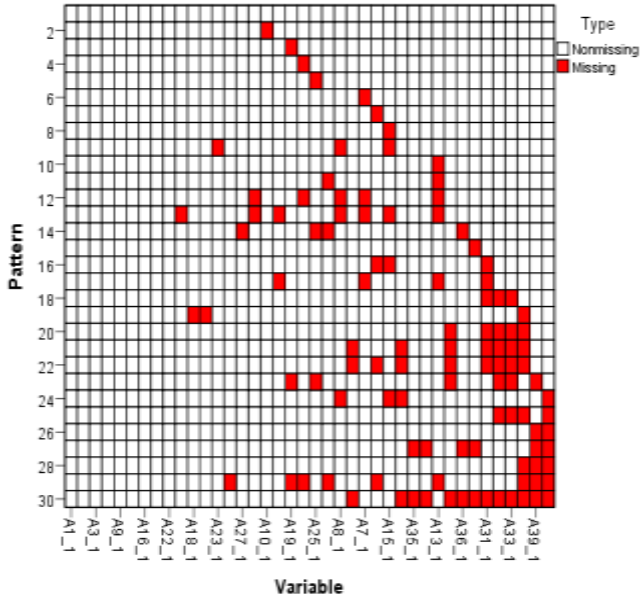

Figure A3. Missing data pattern

Appendix N

Table A10

Extracting the factor(s) for the ITMR at elementary school level

Total Variance Explained[a,b]

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	20.535	51.337	51.337	20.535	51.337	51.337
2	1.805	4.511	55.849	1.805	4.511	55.849
3	1.550	3.876	59.724	1.550	3.876	59.724
4	1.396	3.491	63.216	1.396	3.491	63.216
5	1.115	2.789	66.004	1.115	2.789	66.004
6	1.029	2.572	68.576	1.029	2.572	68.576
7	.920	2.301	70.877			
8	.902	2.255	73.132			
9	.797	1.993	75.125			
10	.752	1.879	77.004			
11	.675	1.688	78.692			
12	.644	1.610	80.302			
13	.606	1.515	81.817			
14	.561	1.403	83.220			
15	.495	1.238	84.459			
16	.477	1.192	85.650			
17	.448	1.119	86.770			
18	.428	1.069	87.839			
19	.409	1.023	88.862			
20	.401	1.003	89.865			
21	.346	.864	90.729			
22	.336	.840	91.569			
23	.295	.739	92.308			
24	.289	.723	93.030			
25	.282	.704	93.734			
26	.271	.677	94.411			
27	.254	.634	95.046			
28	.243	.607	95.653			
29	.208	.519	96.172			
30	.197	.494	96.666			
31	.187	.468	97.133			
32	.163	.407	97.541			
33	.158	.394	97.935			
34	.147	.369	98.303			
35	.137	.342	98.645			
36	.128	.320	98.965			
37	.118	.296	99.261			
38	.108	.271	99.532			
39	.096	.240	99.772			
40	.091	.228	100.000			

Extraction Method: Principal Component Analysis.

a. Imputation Number = 1

b. Only cases for which Imputation Number = 1 are used in the analysis phase.

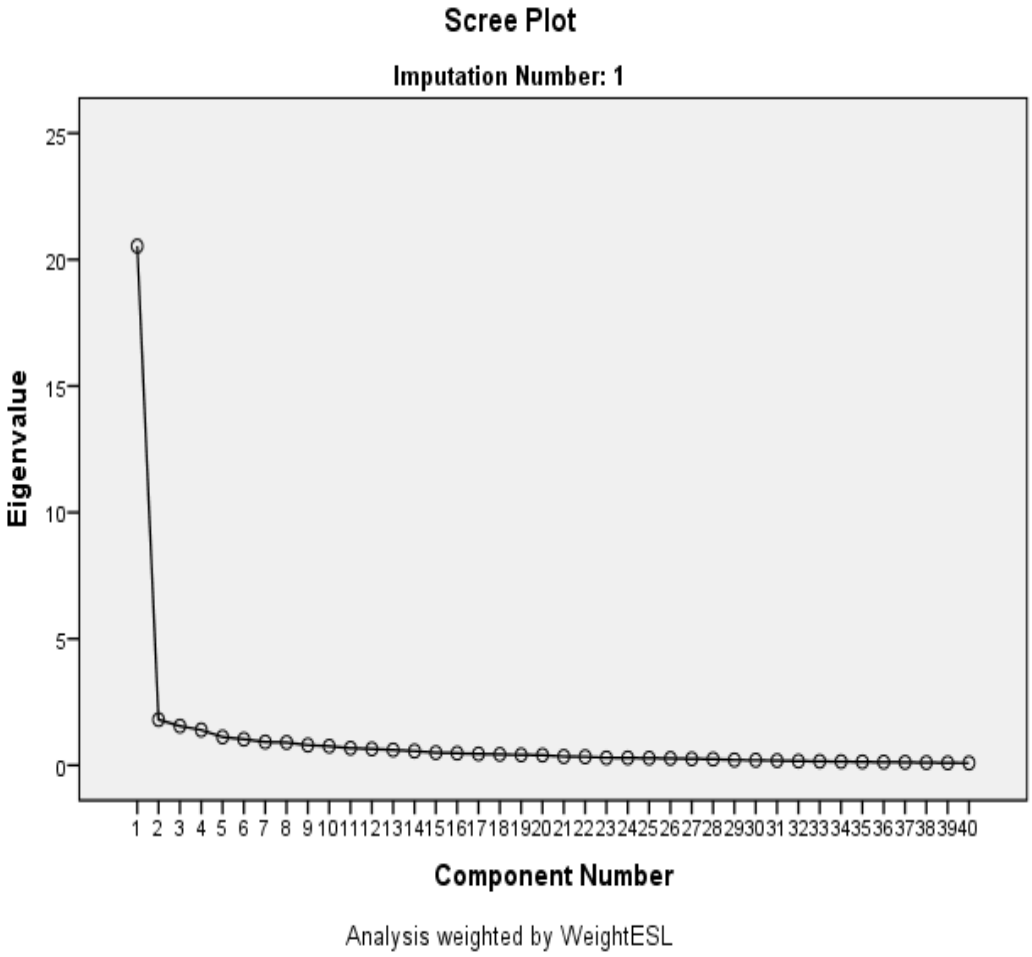

Figure A4. Scree plot for factor extraction

Appendix O

Table A11

Test of homogeneity of variances

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
item1	.737	4	197	.568
item2	3.286	4	197	.012
item3	.835	4	197	.504
item4	.248	4	197	.911
item5	1.146	4	197	.336
item6	6.078	4	197	.000
item7	.617	4	197	.651
item8	.129	4	197	.972
item9	2.838	4	197	.026
item10	3.981	4	197	.004
item11	3.257	4	197	.013
item12	.445	4	197	.776
item13	.298	4	197	.879
item14	.813	4	197	.654
item15	.124	4	197	.974
item16	1.813	4	197	.128
item17	1.802	4	197	.130
item18	3.096	4	197	.017
item19	1.352	4	197	.252
item20	1.627	4	197	.169
item21	.841	4	197	.501
item22	.434	4	197	.784
item23	.964	4	197	.429
item24	.650	4	197	.628
item25	5.541	4	197	.000
item26	1.270	4	197	.283
item27	.926	4	197	.450
item28	2.087	4	197	.084
item29	.264	4	197	.901
item30	2.035	4	197	.091
item31	1.374	4	197	.244
item32	.149	4	197	.963
item33	2.939	4	197	.022
item34	3.589	4	197	.008
item35	2.469	4	197	.046
item36	3.415	4	197	.010
item37	2.021	4	197	.093
item38	1.512	4	197	.200
item39	.516	4	197	.724
item40	.974	4	197	.423
model	3.352	4	197	.011
explain	2.069	4	197	.086
explicitlyteach	1.184	4	197	.319
scaffoldteacher	.389	4	197	.816
metacogDisc	.451	4	197	.771
assessteacher	2.368	4	197	.054
assessself	.890	4	197	.471
independprac	.642	4	197	.633

Appendix P

Table A12

The ITMR at elementary school level

TEACHER ACTIONS	**STUDENT META-BEHAVIORS**				
	Task Evaluation	**Text Evaluation**	**Strategy Selection**	**Real-time Monitoring**	**Performance Evaluation**
Model	How I interpret what the task requires of me as a reader	How I examine the text (e.g., topic, structure, or genre) before reading	How I select appropriate reading strategies for the reading task	How I monitor my text understanding during reading	How I evaluate my task performance
Explain	Why task evaluation is important for task performance	Why text evaluation (e.g., topic, structure, or genre) before reading is important for task performance	Why selecting appropriate reading strategies is important for task performance	Why monitoring text understanding during reading is important for task performance	Why evaluating task performance is important
Explicitly Teach	Students how to evaluate the task they are given	Students how to evaluate the text (e.g. topic, structure, or genre) before reading	Students how to select appropriate reading strategies for the reading task	Students how to monitor their text understanding during reading	Students how to evaluate their task performance
Scaffolding (Teacher's	Help students the task they are given	Help students while they are evaluating the text (e.g., topic,	Help students while they are selecting appropriate reading	Help students while they are monitoring their text	Help students while they are

cooperation with students)	while they are evaluating	structure, or genre) before reading	strategies for the reading task	understanding during reading	evaluating their task performance
Scaffolding (Students' Metacognitive Discussions)	Have students discuss their task evaluations	Have students discuss their text evaluations (e.g., topic, structure, or genre) before reading	Have students discuss their strategies selection for the reading task	Have students discuss their monitoring text understanding during reading	Have students discuss their task performance evaluations
Assess (Teacher)	Provide feedback on students' task evaluations	Provide feedback on students' text evaluations (e.g., topic, structure, or genre) before reading	Provide feedback on students' strategy selections for the reading task	Provide feedback on students' monitoring text understanding during reading	Provide feedback on students' task performance evaluations
Assess (Self)	Have students assess their own task evaluation	Have students assess their own text evaluation (e.g., topic, structure, or genre) before reading	Have students assess their own strategy selection for the reading task	Have students assess their own monitoring text understanding during reading	Have students assess their own task performance
Encourage Independent Performance	Have students demonstrate their independent task evaluations	Have students demonstrate their independent text evaluations (e.g., topic, structure, or genre) before reading	Have students demonstrate their independent strategy selection for the reading task	Have students demonstrate their independent monitoring text understanding during reading	Have students demonstrate their independent task performance evaluations

Note. **Blue** items represent extracted items constituting the ITMR at elementary school level. Lighted items represented deleted items from the initial 40-item set.